GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CXLVI. No. 2928.] LONDON, JUNE 24, 1919. [71st Year. Price 8d.

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C. 2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 London Wall.

TORBAY
STOVE BLACK
FOR GAS COOKERS.

The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

ALUMINIUM
for Efficiency in Lamp Bodies & Reflectors.
See Gas Leaflet by
THE BRITISH ALUMINIUM CO., LTD.,
109, Queen Victoria Street, London.

GAS & CANNEL COAL CONTRACTORS.
WM. F. RUSSELL & SONS.
Telegrams for all Offices: "MONKLAND."
GLASGOW: 90, Mitchell Street;
NEWCASTLE: Exchange Buildings;
HULL: Exchange Buildings, Lowgate;
LIVERPOOL: 5, Castle St.; &
SWANSEA: Atlantic Buildings.

R. & W. HAWTHORN LESLIE & CO., LTD.
In Stock.
TANK LOCOMOTIVES
Always In Progress.
Locomotive & Marine Engineers & Shipbuilders.
NEWCASTLE-ON-TYNE.

INTERMITTENT
VERTICALS.
Adopted all over the World.
Vertical Gas Retort Syndicate LTD.,
17, VICTORIA ST., WESTMINSTER, S.W.
Sole Agents for Australasia—
JAMES HURLL & CO. LTD., SYDNEY.

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

W. PARKINSON & CO.
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON & BIRMINGHAM.
(See Advertisement p. 796).

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

ESTABLISHED — 1861 —
Telegrams: "DRY METERS, LONDON."
Telephone: KENSINGTON, 1140.

George Glover and Co., Ltd.
RANELAGH WORKS
Royal Avenue, Chelsea
LONDON, S.W., 3.

Highest Awards at the Principal International Exhibitions.
Branches at LEEDS (9, Dewsbury Road) and MANCHESTER (Gaythorn Meter Works, Easton St.).

SPECIALISTS IN DRY GAS METERS—SLOT, KEY, AND ORDINARY.
Every meter leaving George Glover and Co.'s works, irrespective of size—and they build up to 3000 Lights—is regulated and tested for soundness at 12 in. pressure, and for registration not only at the ½ in. pressure prescribed by the "Sales of Gas Act," but at 3 in. pressure with full outlet capacity, so as to prevent "slow" registration even when the meter is overworked.
AGENTS FOR THE PATENT M. & M. SELF-LOCKING SLOT METER PADLOCK.

RITCHIE C.I. PIPES FOR GAS & WATER. MIDDLESBROUGH.

KENTISH TOWN, N.W.

J. & J. BRADDOCK

(Branch of Meters Limited),

GLOBE METER WORKS,

Telegrams: "Braddock, Oldham." Telephone 815. **OLDHAM,**

AND

45 & 47, WESTMINSTER BRIDGE ROAD,

Telegrams: "Metrique, Lamb London." Telephone 2419 Hop. **LONDON, S.E. 1.**

MANUFACTURERS OF HIGH-CLASS

GAS STATION METERS.

BRADDOCK'S

STATION GOVERNORS

AND

RETORT-HOUSE GOVERNORS.

IMPROVED

WET & DRY GAS METERS

OF BEST QUALITY.

BRADDOCK'S PATENT

"SLOT" METERS.

FULL PARTICULARS ON APPLICATION.

ARROL-FOULIS

Stoking Machinery

HYDRAULIC COKE PUSHERS

(HUNTER and BARNETT'S PATENT.)

WILL DISCHARGE A RETORT IN ONE OPERATION

LARGE NUMBERS IN USE.

Full Particulars may be obtained from the Sole Makers,

SIR WILLIAM ARROL & CO., Limited,

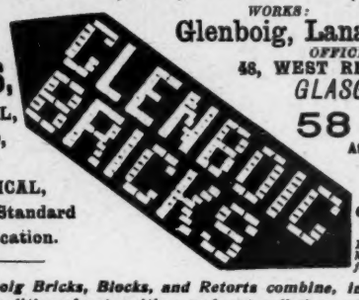
GLASGOW.

LONDON ADDRESS: 56, VICTORIA STREET, S.W

(See Advertisement, June 17, p. 776.)

THE GLENBOIG UNION FIRE-CLAY Co.

GAS-RETORTS, HORIZONTAL, INCLINED, and VERTICAL, to New Standard Specification.



WORKS: Glenboig, Lanarkshire. Ltd.

OFFICES: 48, WEST REGENT ST., GLASGOW.

58 FIRST AWARDS At International and Home Exhibitions, including Grand Prize at Brussels, 1910.

In every case the highest award given for Fire Clay Goods.

The Glenboig Bricks, Blocks, and Retorts combine, in the highest degree, the qualities of not melting, and not splitting, when subjected to the highest heats and sudden changes of temperature, and are, in consequence, found to be economical, even in districts where the local bricks can be had at half the price.

PREVENT

Naphthalene Troubles

BY USING AN

OIL SPRAYING PLANT

(As designed by the South Metropolitan Gas Company, and in use at their stations).

This apparatus is arranged to give the most efficient quantity of finely divided oil spray in relation to the quantity of gas being used.

The oil is perfectly vaporized, and is carried forward by the gas with a minimum of condensation.

The oil being sprayed by gas, no air or steam enters the mains.

Thorough mixing of the oil with the gas.

Simple in construction. Minimum cost to instal. Cheap to operate and maintain.

Prices and Particulars on application to—

THE BRYAN DONKIN COMPANY, LTD.

Head Office and Works: - - CHESTERFIELD.

London Office: 3, Victoria Street, WESTMINSTER, S.W. 1.

CONTENTS.

EDITORIAL NOTES.

An Innovation to Settle Consumers' Grievances . . . 797
Choice of Gas Quality and Plant 797
Government Plans and the Gas Industry . . 798
Heat Losses and Savings in Gas-Furnace Work 799
Higher Prices for Gas-Heating Goods. . . 799
Architects and Housing Schemes—The Man and the Mechanical Coke-Conveyor—Analysis of the Hardstoft Oil—Benzol: A New Electrical Cry—Hard Facts and Electrical Vapourings—Dropping the Practical Man from Fuel Rationing 800

Personal 801
Obituary—John Robert Frith 801
Nationalization of the Coal Mines Proposed. 802
Dutch Gas Association 802
Electricity Supply Memoranda 802
Estimating Phenol in Tar Oils 803
The Utilization of Gaseous Fuel in Commercial Practice, with Consideration of the Types of Gas-Fired Furnaces and Methods for their Control. By F. W. Epworth . . 804
Sixty Years Ago 806
Iron Retort Carbonization—The Greene-Laucks Patents 806
Wales and Monmouthshire District Institution of Gas Engineers and Managers—Meeting at Cardiff 807
The Effect on Gas-Works of the Ways and Communications Bill. By J. Mogford . 808

Carbonizing Plants of the Future, having Regard to the Scarcity of Labour, and the Gas best Suited to the Consumer. By H. D. Madden 809
Refractory Materials Section of the Ceramic Society 811
Good Grade Domestic Coke 811
Plant Life and Gas 811
"B.C.G.A." Conference at Colwyn Bay . . 812
Alderman Phillips's Opening Remarks. . 812
Gas Service in National Housing Schemes. By James Smith 813
Owen Evans on Housing Schemes . . . 815
Benzene in Crude Benzols 815

CORRESPONDENCE.

The "Control Price" of, and the Export of Surplus, Sulphate of Ammonia 816
Reduced Working Hours and Increased Wages 816

REGISTER OF PATENTS.

Applications for Patents 816

MISCELLANEOUS NEWS.

Plymouth Gas Company—Annual Meeting . 816
British Cyanides Company, Ltd.—An Expansion in Turnover 817
Gas Affairs at Wishaw—The Resignation of the Gas Manager 818
Devizes Corporation Gas Undertaking—Scheme for Increasing the Capacity and Efficiency of the Works 818
Gas-Heated Appliances Ascend in Price . . 818
General Gas Appliances, Ltd. 819
Current Sales of Gas Products 819
Stock Market Report 822

PARAGRAPHS.

The "B.C.G.A." Conference at Edinburgh . 802
French "Professional Syndicate" 803
The Peerless Gas-Mantle Company—A Receiver Appointed 816
British Dyestuffs Corporation Capital—Accident at the Rochdale Gas-Works. . . . 820
Water-Gas Plant for Colwyn Bay—Swadlincote Gas Undertaking—Vertical Retorts for Falkirk—Fatal Accident to a Gas Manager's Son—Finances of the Heywood Gas Undertaking—Gas-Works Results at Droitwich—Misfortunes of the Primitiva Gas Company—South African Lighting Association, Ltd.—Tottenham Gas Company's War Work . 821
Beighton Ovens, Ltd.—Gas Finances at Dundee—Gas Stock at Auction—Old Directors at Worksop 822

"JOURNAL" OFFICE TELEPHONE.

The "Journal" Office Telephone Number is "6857 Holborn."

PARKINSON (MAUGHAN) GEYSERS

meet the present national need of

ECONOMY

(1) Economy in Gas Consumption.
(2) Economy in Domestic Work.
(3) Economy in Price and Installation.
(4) Economy in Maintenance Cost.

Prices on Application.

PROMPT DELIVERY OF ALL STANDARD PATTERNS.

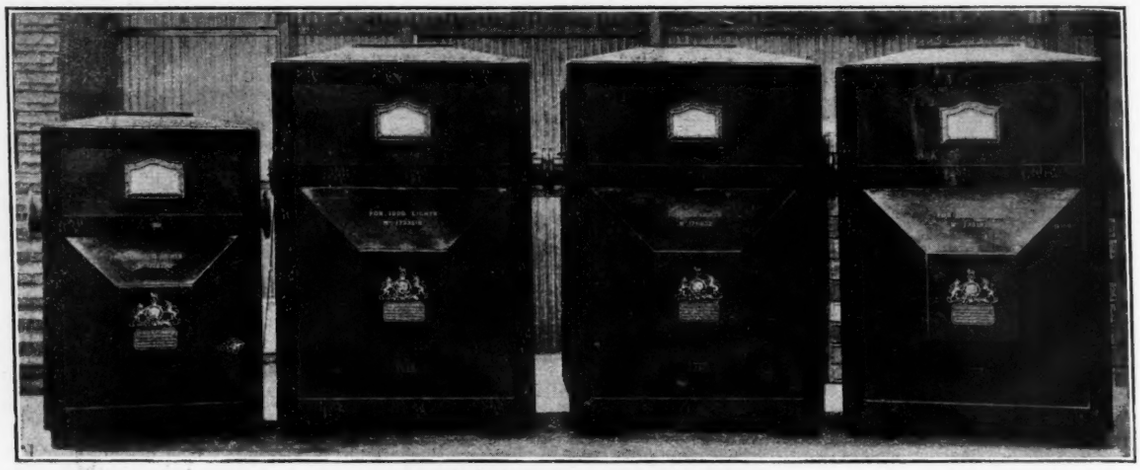
THE PARKINSON STOVE Co., Ltd.

(Incorporating Maughan's Patent Geyser Co.),

Stechford, Birmingham.

LONDON SHOWROOM: 129, HIGH HOLBORN.

"Thomas Glover" Dry Meters



For 500 Lts. "IMPORTANT MUNITIONS." For 1,000 Lts.

Each Thomas Glover Meter now sold contains the result of Three-Quarters of a Century's experience.

THOMAS GLOVER & CO., LTD.

(Original Makers—Established Three-Quarters of a Century),

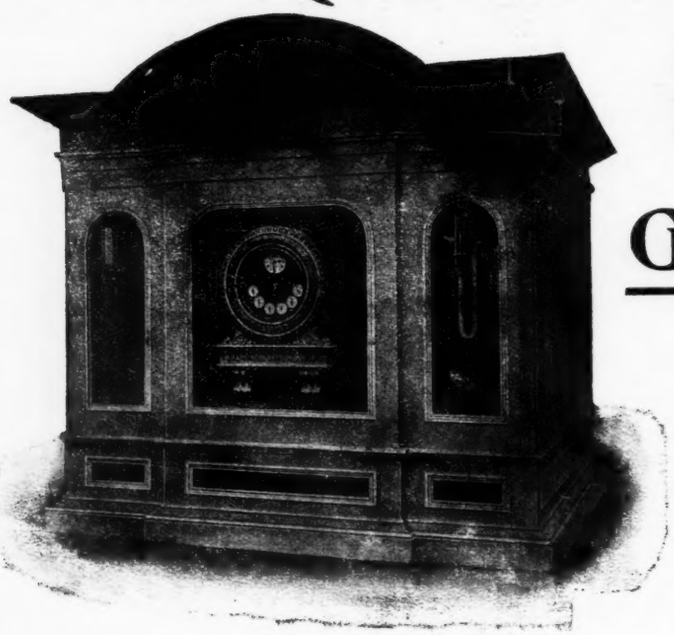
GOTHIC WORKS, ANGEL ROAD, EDMONTON, LONDON, N. 18.

Telephone: 41 Tottenham (3 lines). Telegrams: "Gothic 'Phone, London."

London Show-Rooms: 25, PRINCES STREET, OXFORD CIRCUS, W.1.

Gothic Works, King Edward Road, BIRMINGHAM; 18, Severn Street, Deansgate, MANCHESTER; Gothic Ironworks, FALKIRK; 82, Gordon Street, GLASGOW; 97, Millfield, BELFAST; and 333, Queen Street, MELBOURNE.

PARKINSON'S



Station Meters

AND

Governors

ARE CONSTRUCTED BY SKILLED WORKMEN AND OF THE BEST MATERIALS.

ALL SIZES UP TO **300,000** Cubic Feet Per Hour.

W. PARKINSON & CO.,

(INCORPORATED IN PARKINSON AND W. & B. COWAN, LTD.)

COTTAGE LANE, CITY ROAD, LONDON.	BELL BARN ROAD, BIRMINGHAM.	HILL STREET, BELFAST.
Telegrams: "INDEX, LONDON." *Telephone Nos.:* 7570 City.	"GASMETERS, B'HAM." 2245 Midland, B'ham.	"PREPAYMENT, BELFAST." 3374 Belfast.

SPECIALLY ADAPTED FOR HIGH PRESSURES.

GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLVI., No. 2928.] TUESDAY, JUNE 24, 1919. [71ST YEAR.

EDITORIAL NOTES.

An Innovation to Settle Consumers' Grievances.

A STEP that is reported to have been taken by the Brentwood Gas Company is one that would hardly be applicable to gas undertakings generally. The information has appeared in the "Evening News" that, the Company having been charged with making huge profits at the expense of the consumers, the Directors have invited the formation of a Standing Committee, representative of the customers, employees, and shareholders of the Company to advise on questions of price and quality of gas, and to satisfy themselves that they are being fairly treated. This is an example which few boards of directors will deem it necessary to follow; for already their anxieties and difficulties are bad enough without being parties to a new form of inquisition which would entail further work upon their hard-pressed officials. And even then it might not produce any satisfaction; for the producing, purchasing, and selling operations of a gas undertaking are so diversified and extensive that we doubt very much if any committee of laymen, without independent expert assistance, which would claim time and the time money, would be able to fathom affairs to ascertain whether there was fairness in the prices charged to the consumers. Of course, it is quite idle to-day to say that any statutory or sliding-scale gas company is making huge profits. Even if permitted by their statutes, they could not now afford to pay anything like old dividends. "Huge "profits" is a relative term; and if gas undertakings were allowed to double their pre-war dividends, this would only be consistent with the lower purchasing power of money. But they cannot now pay the old dividends, much less any higher ones.

One curious thing about the discontent that has arisen here and there in the case of gas (and which discontent is testimony to the value of gas as a domestic agent) is that Parliament has, in addition to the sliding-scale of price and dividend, thrown about gas enterprise a large amount of financial limitation and obligations, has stiffened audits, and has compelled the sending of copies of accounts to the elected representatives of the people for their information; and all this designedly for the protection of the consumers. It has effected its object; but the fact is not public property. There is a lack of general knowledge by gas consumers as to the safeguards they possess, which safeguards are altogether absent in the case of other day-by-day necessaries. Prices of other commodities have gone up two, three, and four fold; but there is much less open agitation over these advances than over those in the price of gas. The public knows only too well what has to be paid to-day for household coal; and it looks philosophically upon the solid fact. There is no talk of standing committees of inquiry in relation to coal. But there is a complete omission to recognize that the very coal which costs so much into the coal-cellar is the raw material of the gas industry, and therefore must largely affect the price of gas. There is no thought of the tremendous increase in the market value of labour, from which the gas industry has received no exemption; nor of the 100 to 400 or 500 p.ct. increases of other requirements in the business of gas making, distribution, and use. Gas is made the chief culprit by an abounding ignorance. We cannot see that such committees as that proposed at Brentwood would have any genuine value in the case of most gas undertakings as they rise in the scale of magnitude. They might ensure a better understanding in the areas of small local undertakings; but we are confident that no really good purpose could be served by them in the case of larger concerns—in fact, they would in them be as undesirable as unnecessary. Why gas should provide the scene for this innovation is somewhat puzzling.

Choice of Gas Quality and Plant.

IN the development of systems of gas manufacture, progress has had a quadruple effect. There has been an increase (1) of the B.Th.U. evolved in gaseous form from the coal; (2) in the latest carbonizing systems, most of the secondary products have increased in volume and/or in quality; (3) the labour employed per unit of gas production has vastly diminished; and (4) through the greater thermal efficiency of the manufacturing process, the conservation of coal has been substantially served. This is all to the advantage of both the industry and the country; but for these advances little credit is given to the gas industry. They are accomplished facts; and (such is the reward of merit) the Government have given them no consideration. On the contrary, they have been examining the electrical territory, and have found no time, through inappreciation or unwillingness, to devote to the exploration of the gas territory, and so have got quite off the track of the inherent efficiency and profit of coal carbonization. This is the result of political fancy ignoring practical knowledge, or rising superior to it. These reflections, however, in passing. There has been a mass of information published of late on the progress that has been made in, and the requirements of, gas manufacture and use; and it is as well that the various considerations should be brought into focus in order that their true bearing the one upon the other may not be overlooked. In the paper which he read before the Welsh Institution last week, Mr. H. D. Madden endeavoured to do this; and we would here enlarge upon some of the points he made.

It is commonly agreed to-day that the gas industry must increase the revenue-earning capacity of every ton of coal, while trying to reduce the charges to the users per unit of staple product. This being so, there has first to be considered the quality of gas, with special regard to calorific value, that can best be produced by the gas maker and used by the consumer. The producing capacity of all coal is not the same; the physical characteristics of all coal are not the same; therefore there must be variations in the treatment of the coal. The first thing that has to be done is to determine upon the calorific power of the gas that can be best and most economically manufactured under local circumstances for local conditions of utilization. The Board of Fuel Research has fully recognized the necessity of local option in this matter, as against parliamentary prerogative and inflexibility. We have before urged upon gas engineers the careful consideration of this recommendation, because we are confident that there are comparatively few who have given to the matter the necessary consideration. Economy of production, too, cannot be determined without regard to the question of efficiency in consumers' appliances. We have before this had it submitted as proof by men who ought to have known better, that a gas of a certain and fairly high calorific value is much better than a lower one, because they have tested gas converted from high calorific value to a lower one by simply mixing with it that complex chemical compound air—quite overlooking the fact that they were only doing something which would be done in due course by the burner itself in order to obtain complete combustion, and have in this way really done nothing to vary the composition of the combustible mixture. The simple treatment should have ensured the thermal efficiency being approximately the same. These investigators were merely fooling themselves by what they did, and misleading others. We have had it established by the Gas Investigation

Committee that for certain purposes the efficiency of gases of different calorific values and compositions has, providing appliances are properly adjusted at nipples and air-regulators, an approximate constancy. But this does not apply, without qualification, to conditions where flame structure and temperature are factors of importance. Where this is the case, some regard has to be paid to composition. But a limited sacrifice of efficiency may pay in order to promote increased manufacturing economy and selling ability. So we come to the necessity of determining in every case what is the right compromise to make between the two—efficiency and economy. Mr. Madden supports the Board of Fuel Research and every other gas man of broad view, that for realizing the maximum economy and efficiency at the production end and at the consumers' end, there must be the utmost collaboration between the manufacturers of plant and consuming appliances and the producers of gas. This is a growing feeling; and we now see the strength of the resistance in some quarters to a closer intimacy bending under the strain of significant facts. Time will witness the reaching of the breaking-point.

We have got to the position where it is agreed by the major number of professional gas men, that complete gasification of coal, other than under exceptional conditions, will not for general supply be the most lucrative, nor the most defensive of the interests of the gas industry. There is therefore a steady treading of two main paths for effecting economical production. One is the use of horizontal retorts; the gas being mixed with water gas made in separate generators. [Steaming is being applied to horizontal retorts, but not, relatively speaking, to any great extent.] And the other is the steaming of charges in vertical retorts, both continuous and intermittent. In the uniting of horizontal retort gas and blue water gas, we have what Mr. Madden calls a "mechanical" mixture, and in the other a "chemical" mixture. But all through the two processes are dissimilar in several respects, although both have their adherents and their economizing values. Larger makes and more B.Th.U. per ton of coal are secured by the steaming process than is advisable with horizontal retort coal gas and water-gas mixture; and this is due to the efficacy of the constant regulated steaming in continuous vertical retorts in bringing to the credit of the gas more of the volatile constituents of the coal, combined with an enhanced return of ammonia and liquid products. This is a superiority that, so far as experiment has yet informed us, can never be equalled by horizontal working. But in these days of strange mutation, one can never be sure as to what will happen. Here, again, in the choice of the two systems, coal is a determining factor as to which system to adopt—the horizontals and blue water gas or verticals and steaming. Coal varies physically and in composition; and different heats are required for different coals. With care over temperatures and proper control, there are no coals that cannot be carbonized with high efficiency in vertical retorts, with good heating arrangements, except coal with a large proportion of dust. Coal dust is a bad heat conductor; and this renders a dusty coal anything but the most suitable for vertical retort handling and steaming. There is a falling away in such cases from the high standard of efficiency realized with vertical retorts, steaming, and coal comparatively free from dust. Moreover, with continuous vertical retorts (which Mr. Madden very strongly favours), there is a graduation of temperatures, which contributes to the treatment of the coal in a manner that is productive of high results, quantitatively and qualitatively, in both gas and other products.

Even if equal effects in steaming could not have been realized, we had hoped before this to have witnessed radical structural developments which would have introduced into horizontal working part, if not all, of the conditions that have been found so efficacious in vertical retort operation. There was the plan that was some time since patented by Mr. John West and Mr. W. Wild, which had for its purpose the continuous carbonization of coal in horizontal retorts, the utilization of graduated temperatures, and the thermal economy derived from the discharging of the coke in a fairly cool condition. Since the publication of the patent specification, nothing definite has been heard of the proposal. Experimentally the scheme may have shown up well; but there are many other matters that may largely discount the credits realized from the embodiment in horizontal working of some of the principles that form part of the continuous vertical system. There is, however, room for a great improvement in the horizontal system to lessen the distance that by modern development has been placed between it and the vertical retort. At the same time, there are certain conditions of coal that will cause horizontal retorts to continue their existence—a considerable existence—into the far distant future; and with the product there will be a large amount of water gas used. Other than in those works that are exceptionally placed, it looks as though flexibility in producing economy and in meeting demands, safety of supply, an unlimited coal-purchasing power, and an ability to make blue water gas for mixing and for industrial purposes will see vertical retorts, horizontal retorts, and water-gas plant established on gas-works—providing scope permits. At the same time, there is no question that vertical retorts are first favourites for the realization of the greatest value from coal, even from the comparatively poor gas-making coals yielded by Wales. Five years' experience with continuous vertical retorts at Cardiff has won for them the affections of Mr. Madden; and he looks to them to play a considerable part in the provision of the gas which new conditions and larger service have marked as essential. While mentioning this, there is witness in his paper as to a structural point. He has, during the same period, had experience with all-silica retorts in the vertical settings. The transmission of heat through the retorts is very rapid; and they have maintained their original shape, notwithstanding that the working temperatures in the combustion zones have been maintained at about 1260° C. (2300° Fahr.).

Government Plans and the Gas Industry.

RECONSTRUCTION of industry has long been freely talked about. Whatever is done in this respect in industries generally should be of advantage to the gas industry, if it is enabled to remodel its own statutorily defined customs and ways. The reconstructional schemes which the Government have in hand should be for the general weal of the country; but the impression is gaining ground that they are ones that have about them much to be feared. Before the war, the Government did not show any striking interest in industrial matters, nor did they do anything special or good to promote the advance of British industry and commerce at home or across the seas. Those industries that came under their control were tightly harnessed, so that the liberty of motion which is essential to the maximum progress was absent. The reconstruction schemes being taken in hand by the Government mean nationalization; nationalization speaks of bureaucratic control; and bureaucracy is accursed in the eyes of most business men. During the war, the trading necessitated by it has not furnished certificates of merit for the major part of the Government departments concerned; but it has shown an immense looseness in organization, wastefulness, and absence of business aptitude. A few departments only distinguished themselves otherwise; and in this connection we may specially mention the officials with whom the gas industry has relations at the Board of Trade, and those with whom they had all along to work in the Explosives Supply Department of the Ministry of Munitions.

In a paper which Mr. J. Mogford, of Briton Ferry, read at the Welsh Institution meeting last Thursday, he examined the proposals of the Ways and Communications Bill. These proposals, in so far as they will facilitate transport, should, in his opinion, prove advantageous to the gas industry, as any acceleration or cheapening of the transit of coal and other material would tend to lower the cost of production, and cheapen the supply of gas to the consumer. Improvement of transport can only come by reconstruction; but under present conditions as to labour and materials, and the enormous weight of 5 p.ct. loans and bonds that the Government have to carry, together with the pernicious formulæ and limitations that flourish under bureaucratic administration, we cannot at present see where the change is going to cheapen the transport of coal and other goods. If in the event it does so, we shall be highly gratified; but, gauging the matter by past experience, misgivings successfully stem-back any cheerful optimism.

The main part of Mr. Mogford's paper deals with the question of national electricity generation, which, by a clause in the Government Electricity Bill, is to come under the control of the Ministry of Ways and Communications. At Westminster, there are to be Electricity Commissioners and District Electricity Boards throughout the country.

These will be responsible to the Ministry of Ways and Communications (unless the clause is defeated), and the Ministry will be responsible to Parliament. The electricity industry is not to be envied their destined position. But Mr. Mogford (as do responsible gas men generally) sees the possibility of the electricity generation scheme being used detrimentally to the gas industry. Now is the time for the industry to make a strenuous move for having its position recognized, its powers of progress and resistance to outside injury augmented, and protection—not only in its own interests, but in those of the nation—embodied in the Electricity Bill. The gas industry has had its position as a user of coal and a supplier of light, heat, and power, and other commodities, plainly and truthfully set forth; and, in comparison with the electricity industry, it comes out in a manner which, if ignored by the Government, will be a dereliction of duty on their part, and a betrayal of the interests of the country. Words cannot be too strong for an attitude that would be antagonistic to proved superiority in both economy and service. Though we do not favour Government control and all it leads to, no one can foretell what developments may ensue from this electricity generation scheme; and the gas industry must take no chances. Mr. Mogford sees the prospect of competition being strengthened; the need for reconstructing present methods of gas production and supply; and the absorption of small uneconomical concerns by larger and more economical ones. We are with him. Whatever befalls as a consequence of the reformation of electricity generation, the gas industry will, by being modernized and braced-up, be all the better for meeting competition, for extending service, and for doing it all at prices that are fair, consistent with the prevailing conditions as to money, materials, and labour. In the paper it is advocated that for purposes other than carbonization the use of bituminous coal should cease as far as is practicable, so that as much as possible of the value that is in that class of coal should be recovered for the benefit of the country and its industries. These are all matters that require the individual thought and action in spreading information of every responsible individual in the gas industry, as individual thought and action mean continual reinforcement of collective action through the National Gas Council.

Heat Losses and Savings in Gas-Furnace Work.

IN this issue we complete the publication of the prize essay, on the utilization of "Gaseous Fuel in Commercial Practice," which won for Mr. F. W. Epworth, of the Richmond Gas Stove and Meter Company, the Hadfield £100 prize. The offer of the prize was made through the Society of British Gas Industries, the Council of which adjudicated upon the essays; and it is not very creditable to have to say that there was not a further essay submitted that was found worthy the second prize of £50. The winning essay is a piece of work which speaks of patience, diligence, and skill on the part of the winner; for the heap of calculations that he has made, with the view of proving his case that, in the utilization of gaseous fuel in funace-work, there is a mass of deficiency from which a much higher heat efficiency can be realized, is no routine performance. It is common knowledge that in many forms of industrial gas-furnaces there are considerable heat losses. There are the losses by conduction and radiation; and it is the business of the makers of the furnaces, in the interests of efficiency and their own reputations, to suppress these as much as possible. The other causes of loss are divisible between makers and users. Imperfect combustion is one. The makers' part is to ensure, so far as structural work will enable them to do so, that the combustion of the gas may be as perfect as possible. But, after all is done in this way, unless there is proper control on the part of the users, the efforts of the makers may be sadly defeated; and the greatest loss of all—the heat carried away by the products of combustion—will be heavily augmented by the want of care in use. Heat losses cannot be entirely avoided; but they can be largely reduced—even the part of the heat that leaves the furnaces in the products of combustion. This is the source of waste upon which Mr. Epworth largely concentrates.

The first part of the essay, however, sets out the principles governing the control of gaseous fuels, with the view to securing proper combustion, and modifying the amount of loss for which the products form a ready vehicle, and of the magnitude of which loss few engaged on gas-furnace work have any clear conception. This is also true regarding the influence of excessive air over and above that required for complete combustion on the heat carried away by the products. In this connection, a few words as to the tables. So far as we are aware, the information contained in the first part of the essay has not been published previously for the various typical gases under comparable varying conditions. In Table II. are supplied the mean specific heats of common gases used in the calculations. These figures have been recalculated from the original equations of Holborn and Henning, and should be of great service to those dealing with gaseous thermal problems. To recover part of the heat (so improving the thermal efficiency of the furnace) that would otherwise be lost in the products of combustion, Mr. Epworth is strongly in favour of preheating the air by this otherwise waste heat; and he gives reasons for preferring to preheat the air rather than the gas. A careful study of Tables XII. to XVI. will show why it is necessary to make use of the heat in the products for air preheating in order to raise the efficiency. Looking at Table XVI., it is seen that, with the products leaving at 1400° C. (combustion in air) 61·6 p.ct. of the total available heat is contained in the flue products; and this could be largely recovered by the preheating principle. The influence of excess air over and above that required for complete combustion on the amount of heat carried off by the products is also seen, which is a robbery of heat from the furnace which could be avoided. Then, again, another lesson is that the poorer the gas—such as Mond and producer gas—the greater the amount of heat taken out by the products relative to the total amount of heat yielded by combustion. It will be remarked how well water gas stands in respect of loss of heat to the products; and it shows in this regard an approximation to town gas and carbon monoxide. As to the calorific intensity Tables XVII. to XXI. (showing how excess air depresses flame temperature), these are purely theoretical; but, having been calculated under similar conditions, they enable a rough comparison to be made of the efficacy of different commercial fuel gases under varied conditions of actual use.

The conclusions to be drawn from the essay appear to be to preheat the air for combustion as thoroughly as possible by means of the waste heat in the flue gases, and to supply the fuel gas to the furnace as hot as possible; but it is not advisable to attempt to preheat the gas much over 500° C. It is evident, too, from consideration of the first part of the paper, that economy and success in the use of gas for industrial heating are dependent upon the use of the correct ratio of air to gas. This being so, and as gas-fired furnaces are mostly handled by inexperienced workmen, a really reliable indicator to show when the gas and air are in the correct proportions would be exceedingly useful. The automatic controls at present on the market for gas and air blast furnaces only deliver gas and air in fairly constant ratios; the user having to determine by experience the ratio which will give the best result. The incandescent mantle method referred to by Mr. Epworth is simple; and if it could be fitted with a modest photometrical device for finding the point of maximum illumination, it would in all probability be very successful. The plan outlined in the essay for exploding mixture samples would also be good, but would not show the changes in the gas automatically, and could not easily be made to give a continuous record. The essay supplies a piece of genuinely useful work.

Higher Prices for Gas-Heating Goods.

Higher and still higher costs for the gas industry; and the end of the tale is not yet told. A fresh accession comes this time from the firms manufacturing gas-heating appliances; and what is more they are unanimous in stating that they cannot go on longer without additions to their prices, and conditions of sale which will protect them against the vagaries of the markets from which they have to draw their supplies. The announcement the gas-stove makers have now made was anticipated by us in the "JOURNAL" for May 27 (p. 477). There was nothing peculiar about the anticipation. It was patent with the withdrawal of the Government subsidy on iron and steel, and the fact that manufacturers who up to May 1 were paying 95s. per ton for pig iron found themselves faced with 165s. per ton as the price for all deliveries, and an uncertainty as to whether this was the crest of the increase. The stove-making industry is labouring under the same disabilities as other industries. Fuel and other materials have been

consistently moving upwards; and labour has taken its full share in wages and shorter working hours. But for twelve months now the firms have borne these advances without (during that period) raising the prices of their goods. They had hoped for better times; and the hope has not materialized. The facts are plain; and the advances made have had to be substantial, as will be seen by the announcement in our news columns. They realize fully that the higher the prices of their goods, the lower the capacity of gas undertakings for placing them. This re-acts upon themselves. It diminishes their output, which has an ill-effect upon charges which with greater production are lowered. These, however, are commonplaces to every business man; but they are sometimes overlooked where feelings of resentment and disappointment prevail. It is, however, a pity that an advance in the price of gas-heating goods is imperative just when the gas industry is moving in order to strengthen its position as suppliers of heating gas.

Architects and Housing Schemes.

The British Commercial Gas Association has evidently not succeeded in reaching and converting all architects who have imbibed wrong tenets regarding light, heat, and power. There are still some about the country who, in ignorance, are doing mischief through having credulously taken in all that has been said about electricity, and who have insufficient knowledge to enable them to grasp the truth of the relative positions of gas and electricity. Some architects seem to think more of effect than of householders' economy, which is of greater importance in housing schemes. At the meeting of the Wales Institution of Gas Engineers last Thursday, Mr. E. Rees stated that, at Port Talbot, there is a project for erecting 1200 houses to accommodate the men of a private firm. The responsible architect had been interviewed by Mr. Rees, who finds it a difficult matter to convince gentlemen of the profession that the gas industry can provide such houses with a better service of light and heat than electricity. Architects who are doubters should be invited to an actual demonstration of comparative economy. Mr. Rees puts their attitude down to the effects of the recent electrical propaganda in connection with the super-power schemes. The untruths circulated have so poisoned people's minds that electrical men have themselves begun to be alarmed at the prospect of not being able to redeem (as they knew they never would be able to) the promises made through the columns of the lay Press.

The Man and the Mechanical Coke-Conveyor.

Manual labour is becoming so costly that naturally engineers will be weighing-up more finely than ever the relative costs as between manual and mechanical operation. The whole basis of comparison has been changed. Take coke handling, for instance. The man costs much more now than formerly; but the coke-conveyor does not wear out more rapidly than before. Its initial cost is considerably more than in pre-war days, and so are the upkeep expenses. But the man's wages are now about double what they were before the war. In an article on the handling of coke, a writer in "The Times Engineering Supplement" refers to the changed conditions which make mechanical operation more attractive than manual where it can be introduced. He points out that for the wages of each man who is replaced by mechanical operation, a capital outlay on plant of about £1400 is warranted at the present time. A wage of £4 a week means £208 a year. Interest on capital, wear and tear, and depreciation on the £1400 at 14 p.ct. would amount to £196; and as the 14 p.ct. includes 7 p.ct. depreciation, the capital expenditure is annually written-down—the first year by £98, so that automatically year by year the interest is reduced. Though machinery does occasionally break-down, it does not go on strike, it is not perpetually suffering from grievances, it does not ask for a forty-seven (or any other) hour day, and really there is in these times less uncertainty about a machine than about the men in some occupations.

Analysis of the Hardstoft Oil.

The oil from the Hardstoft well (to which references have already appeared in these columns) was subjected to analysis by the late Sir Boverton Redwood. He reported that the general character of the oil is of a limpid nature, showing a dark brown colour by transmitted light, but of a marked green fluorescence by reflected light; and it has a characteristic odour. It contains only a trace of water, and has a specific gravity at 60° Fahr. of ·828. The flash point is 73° Fahr. On distilling at below 150° C., it shows a 4·5 p.ct. volume of petroleum spirit, and on distilling between 150° and 300° C. 41 p.ct. of petroleum lamp oil and kerosene. The oil is stated to be a true natural paraffin-base petroleum of excellent quality, from which it should be possible to obtain 9 or 10 p.ct. of motor spirit. A further analysis by Mr. J. L. Hackford, F.I.C., shows that the commercial products obtainable from the oil include 7½ p.ct. of motor spirit, 39 p.ct. of kerosene, 30·5 p.ct. of lubricating oil, 3 p.ct. of paraffin wax, and 20 p.ct. of gas oil, the basis of fuel oils. A certain percentage of sulphur is also yielded. The Chesterfield correspondent of the "Daily Telegraph" states that he learns that oil exists at Hardstoft in huge quantities. His informant—carried away perhaps by the success of the venture—declared that there was sufficient oil to pay off the National Debt. We have a recollection that somewhat similar statements were once made regarding low-temperature coal carbonization.

Benzol—A New Electrical Cry.

The electricity industry has just had offered to it a new cry. A "Fuel Expert" has discovered it. Coal supply is getting shorter and shorter; and the country may be promised that the supply will run lower still if electricity is allowed to continue to burn coal under its boilers for the production of heat energy in its own wasteful mode. As things are going, and at the price of coal, the country cannot afford to let the electricity industry (till it has shown it has radically mended its ways) use more coal, which is needed—solid or gasified—for heat by more people than require it for power. "Fuel Expert" does not look to the super-generating stations to produce the economies that some of the electrical Ulysses suggest; and so for justification for larger operations he falls back upon coal carbonization by the electrical industry in order to produce bye-products. This is where he raises the cry of "Benzol," which is an attractive word at the present time when there is a vastly increasing desire to make the country as largely independent as possible of others for all forms of motor fuel. Fancy the electricity industry, which "Meteor," in pompous and bombastic language, says has become the industry of "first, second, and third importance" (other industries being allowed minor places), having to fall back upon benzol for justification for encroaching to a larger extent upon our coal resources.

Hard Facts and Electrical Vapourings.

Different coals, different capacities for benzol production. It may be only ¾ gallon or 3 gallons per ton; but benzol alone will not help the electricity industry to a higher state of thermal efficiency. However coal is dealt with by the electrical industry, no electrician can get rid of those terribly heavy heat losses between boiler and consumers' terminals. With a blind eye to facts, "Meteor," in his comment, urges that electricity must have first claim upon the coal it requires; then other industries with less vital services may begin to urge their claims. In respect of coal, the gas industry is thus to follow not precede the electricity industry. It happens, however, that the gas industry prefers to place itself, and not submit to the discretion of "Meteor." He also contends that "there is no other industry of sufficient importance to dictate how our [the electricity industry's] fuel shall be treated; it must be left entirely to electricity." "Meteor" seems to be mightily perturbed, and to have lost the true perspective of things. May we, without further raising his ire, ask what the electricity industry has done to show itself true and superior conservators of coal? May we remind him that there is a great gulf between a 5 to 10 p.ct. efficiency and a 70 to 80 p.ct.? It is not a fourth, fifth, or sixth rate industry that can boast the latter; but it is one that has to look a great distance behind to discover the electrical industry. Pretence has undergone considerable electrical culture.

Dropping the Practical Man from Fuel Rationing.

In some quarters there is apprehension as to what will happen in the matter of rationing through the resolve of the Coal Controller's Department to dissolve the Special Local Fuel and Lighting Committees, and to transfer the control hitherto exercised by the Local Fuel Overseer to the local authority—except in the Metropolitan Division, which will continue under the im-

mediate supervision of the Household Fuel and Lighting Branch of the Coal Control Department. The fuel supervisors have already been notified that their executive powers have passed away, and that they may be used in an advisory capacity. A prominent coal merchant says these changes mean the dropping of the practical man and the elevation of the official. He expresses the fear that local rationing will not work so smoothly as it has done.

PERSONAL.

The Etruria Appointment.

Mr. Harold E. Copp (who has gone to Hull) is to be succeeded as Manager of the Etruria works of the British Gas Company, Ltd., by Mr. C. RHODES ARMITAGE, at present the Engineer and Manager of the Lancaster Corporation Gas-Works, to which position he was appointed on the retirement of his father (Mr. Charles Armitage) in 1913. Mr. Armitage, on leaving school, was for some time with his father, and then served his articles at the Nottingham Gas-Works, and qualified in chemistry, engineering, and gas manufacture at the Nottingham University. He was appointed Assistant at Nottingham, and afterwards Assistant-Manager of the Preston Gas-Works. In 1909 he became Gas Manager at Morecambe; and left there to go to Lancaster.

Mr. F. W. POTTER, the Engineer-in-Chief of the Shanghai Gas Company, Ltd., has been granted six months' leave of absence, and is expected to shortly arrive in England.

Mr. HAROLD HARTLEY, the Richmond Gas Stove and Meter Company's Chief Chemist, has been elected to the degree of Doctor of Science by the Senate of the University of Manchester.

Captain C. M. WILSON, of the Royal Army Ordnance Corps, has been awarded the Military Cross for distinguished services in connection with military operations in France and Flanders. He served two years on the Western front, and is now stationed in Dublin. Before the war, Captain Wilson was with the Barrowfield Iron-Works in Glasgow, was then Assistant at the Greenock Gas-Works, and finally for two-and-a-half years Chief Technical Assistant to the Aldershot District Gas Company.

Mr. P. D. WALMSLEY, B.Sc., who for the past eleven years has been Gas Engineer to the Wombwell (Yorks.) Urban District Council, has been appointed General Manager and Engineer to the Great Yarmouth Gas Company. The Council have expressed their high appreciation of Mr. Walmsley's services, and their regret that he is severing his connection with the Wombwell undertaking. Mr. Walmsley served his apprenticeship at the Tyldesley (Lancs.) Gas and Water Works, and took a three years' course in Engineering and Chemistry at Owen College, Manchester, where he obtained the Degree of B.Sc. with honours in Engineering. He also qualified for M.Sc. in Engineering, but has not taken it up. From Owen College, he went into the drawing office of Messrs. R. & J. Dempster, at Manchester, and from there as Chief Assistant to Mr. George Helps, at Nuneaton, where he remained for four years. Leaving Nuneaton in 1908, he went to Wombwell, where he has spent an active time. In this connection, special mention may be made of the part taken by Wombwell in laying out their works to demonstrate the recovery of benzol and toluol for war purposes. The plant was described in the "JOURNAL" just three years ago.

Captain J. CARR (a son of Mr. Isaac Carr, of Widnes), commanding No. 6 Battery, Motor Machine Gun Corps, has been awarded the Military Cross for gallantry and devotion to duty in the field. All through the final advance on the Ypres front, he kept continual touch with the forward infantry, and brought his battery into action on many occasions, and greatly assisted them in their advance by knocking out enemy machine guns, and keeping down enemy rifle fire. After the completion of these operations, a letter was received by his Commanding Officer from the G.O.C. 29th Division saying: "The battery of your Motor Machine Gun Brigade who have been working with this Division in the late successful operations, have done splendid service. Please convey to the officer commanding and all ranks my appreciation of the great help they have been to us, and thank them for all they have done for my division." Captain Carr in January of this year was awarded the Belgian Croix de Guerre for exceptionally good work in Flanders; while Captain Carr's brother, Captain Robert Carr, R.E., was awarded the M.C. in 1916.

Mr. PETER M'DOUGALL has been appointed by the Newcastle and Gateshead Gas Company to be Superintendent of their gas and chemical works at a salary of £425.

Lieut.-Col. OSCAR H. FOGG, recently of the Ordnance Department of the United States Army, has been unanimously elected by the Executive Board to the position of Secretary-Manager of the American Gas Association. He has led an active life in the industry, and is personally known to many gas men on this side, who will wish him every success in his new sphere.

The annual meeting of the Illuminating Engineering Society will be held at 8 o'clock this (Tuesday) evening at the rooms of the Royal Society of Arts. After the transaction of formal business, a discussion on "Street Lighting Reconstruction Problems" will be opened by Mr. L. Gaster.

OBITUARY.

JOHN ROBERT FRITH.

THE death has regretfully to be announced of the head of a well-known family in the gas industry—Mr. John Robert Frith, whose name has for so many years been associated with the gas undertaking at Runcorn, of which town he was, indeed, one of the oldest residents. He had reached the ripe old age of 85½ years, and retained his faculties remarkably well right up to his death on Monday of last week. No more than three weeks ago he paid a visit to the gas-works, to inspect some improvements which were being carried out by his son, Mr. George S. Frith, the present Secretary and Manager of the Gas Company.

Mr. Frith was born at Stafford in 1834, and on the completion of his education entered the service of the Gas Company in the town, under Mr. William Etchells, who was then engineer. Eight years' later, Mr. Frith became Secretary and Manager of the Longton Gas Company; and in 1863 he left to take up a similar position with the Runcorn Gas Company. The condition of the Runcorn Gas-Works offered plenty of scope for an energetic man; and Mr. Frith had been with the Company but a very short time when it became necessary to enlarge them. He recommended removal to another site, and eventually ground was acquired near the old works. In 1885 the works again proved too small for the requirements of the Company; and it was decided to remove to an entirely new site in Halton Road. The whole of the buildings, &c., were designed by Mr. Frith, and were carried out under his direction. Improvements have been introduced from time to time, until now the Company possesses one of the most compact and best-arranged gas-works in the country.

He was one of the pioneers in the regenerative firing of retorts—making a number of experiments, and expecting considerable improvements in the original designs of the furnaces. An original member of the old British Association of Gas Managers, he took part in many meetings. The last meeting of the Institution which he attended was at Liverpool, in 1914. Of the original members just referred to, probably his old friend Mr. W. R. Cooper, of Banbury, is now the only survivor. Though he never took a very prominent part in public life, he was a good speaker. To local education matters he devoted much attention; and his services were frequently sought by other undertakings in a consultative capacity.

When he resigned his position, he was succeeded by his second son, Mr. George S. Frith, the Hon. Secretary to the Manchester District Institution of Gas Engineers. Another of the three sons, Mr. Ernest Frith, is Secretary and Manager of the Frodsham Gas Company. Mr. Frith celebrated his golden wedding eight years ago, when, among other presents, he received three silver gilt fruit dishes from the Runcorn Gas Company, as a token of their esteem. His wife survives him.

The funeral was on Wednesday, at the Runcorn Cemetery; Mr. Isaac Carr, of Widnes, being among the sorrowing friends who were present.

The death occurred on Monday of last week, at his residence, "Mossgiel," Regent Road, Altrincham, of Mr. JOSEPH EDWARD LAMB, the Managing-Director of the Altrincham Gas Company. Deceased, who was in his 65th year, had been in poor health for some time, and over a month before he died had had to take to his bed. He joined the Altrincham Gas Company in March, 1884, as Accountant, and was appointed Manager in June, 1887, and afterwards Engineer and Manager. On the appointment in December, 1912, of Mr. H. R. S. Williams as Works Engineer and Manager, Mr. Lamb became General Manager; and in February, 1918, he was elected on the Board of Directors as Managing-Director. He was a member for many years of the Gas Institute and Institution of Gas Engineers, as well as of the Manchester District Institution of Gas Engineers, though not taking a very prominent part in the proceedings. Under his management, the Altrincham Gas Company rose from a 68 million to a 240 million works. He leaves two daughters, his wife having died some few years ago. To them, and to his brother Mr. F. H. Lamb (of Messrs. Donald Macpherson and Co., Ltd.), sympathy will be extended. The funeral last Thursday was largely attended by Directors, officers, and workmen of the Gas Company, as well as by representatives of local bodies, and friends connected with the gas industry. Mr. S. Meunier, of Stockport, represented the Manchester District Institution of Gas Engineers.

The death is recorded, which took place on May 11, of M. LÉON POTTIER, a prominent member of the staff of the "Journal des Usines à Gaz" from its foundation until the year 1885.

Mr. H. H. GARDNER, who had been Chairman of the Worthing Gas Light and Coke Company since 1891, and a Director for close upon forty years, died last week. He was formerly closely connected with Tarring, and much of the development of the neighbourhood was directly due to him.

A commission agent in Valencia desires to obtain agencies for United Kingdom manufacturers of sulphate of ammonia and nitrate of soda. Inquirers of the Comptroller-General, Department of Overseas Trade (Development and Intelligence), No. 73, Basinghall Street, E.C.2, must quote: Spain, No. 1194.

NATIONALIZATION OF THE COAL MINES PROPOSED.

AT the final stage of our preparations for press this week, four reports are published by the members of the Coal Commission on the nationalization of coal mines and mineral rights. We cannot, therefore, on this occasion do more, through pressure of time, than touch upon these portentous documents. It would, of course, be idle to say there has not been grave discontent in the country, particularly during the period of Government control, with the position of affairs in the coal industry in relation to both supplies and prices; but the country generally has expressed no desire for, but (so far as it has been possible to gather) the feeling is one of aversion to anything approaching nationalization. A very significant fact, however, is that all of the reports are favourable to the extinction, in part or in whole, of the conditions that now exist, and to something else superseding them. The least change of all is naturally by the coalowners' representatives, who are not opposed to the acquisition of mining royalties under carefully prescribed conditions, but believe that nationalization would be detrimental to the development of the coal industry and to the economic life of the country. The only independent report is that made by Sir Arthur Duckham, who is also favourable to the acquisition of mining royalties, and the amalgamation of colliery interests in the various areas, and their administration by District Boards, who would be granted a lease from the Crown to work coal and other minerals. But the report that will, it is to be feared, be adopted by the Government is that of Mr. Justice Sankey, who is supported by the miners' representatives and their friends. In this, it is recommended that there should be immediate State acquisition of coal royalties, acceptance of the principle of State ownership of the mines, and a scheme of local administration of the mines for three years, followed by their purchase by the Government. The miners' representatives and their friends concur with the Chairman's views; and they also ask for an immediate inquiry into the causes of the recent decline of output, which they believe will be found to have existence in places and for reasons for which the miners themselves cannot be held chargeable.

There is a twofold danger in the attitude adopted by Mr. Justice Sankey in this matter. Though minerals come into a different category from other industries, this will open the way to the extremists adopting nationalization as a policy, and new internal trouble for the country is brought into closer view. As to coal, as Sir Arthur Duckham well puts it, "nationalization of the coal mining industry would be an unprecedented and colossal experiment. A mistake would result in a national calamity." The weight of evidence, it seems to us, was entirely against nationalization, but was in favour of the imposition of a middle course giving greater control and concentration through (say) boards of competent constitution. In view of this, and the very general feeling there is among intelligent men in opposition, a great deal of uneasiness will be generated throughout the country in finding that Mr. Justice Sankey has placed himself so unreservedly in the same boat with Mr. Smillie and his friends. Government control of coal during the war has furnished lessons which should not go unheeded. It has been so largely repugnant to the interests of the country, that the people and the industries will not look with equanimity upon it for another three years, to be followed by complete State ownership, if Parliament endorses the Sankey-Smillie-Money-Webb, and Co.'s recommendations. Never, indeed, was the coal service of the country in a more abject mess; and this six months after the armistice, with the number of miners at work at the pre-war level!

It will be noticed in the report of Sir Arthur Duckham that he recommends the appointment of Commissioners for Heat, Light, and Power, who should undertake a full inquiry into the wastage of fuel and the best methods of effecting economies throughout the country. This inquiry should have been made before the Government committed itself to its electricity schemes, which supply another instance of Government misdirection, and stubborn action upon that misdirection.

Dutch Gas Association.

The number of "Het Gas" for the 14th inst., contains the programme of the forty-seventh annual meeting of the Association of Dutch Gas Engineers, which is being held at Maastricht this week (from Tuesday to Thursday), under the presidency of Heer M. C. Sissingh. The report of the Association for the year 1918 is also published, together with reports of various committees, and the accounts, during which period Heer O. S. Knottnerus was President.

The "B.C.G.A." Conference at Edinburgh.—We are asked to mention that Major F. Cornelius-Wheeler, who addressed the recent Edinburgh Conference of the "B.C.G.A.," upon the subject of the economies that can be effected in building construction when gas-heating stoves are to be provided, instead of coal fires, is the Manager of the Architectural Decorations Department of the Nautilus Fire Company, Ltd.—now under the proprietorship of the Davis Gas-Stove Company. We hope shortly to be in a position to publish the plans used by Major Cornelius-Wheeler to illustrate the main points of his address.

ELECTRICITY SUPPLY MEMORANDA.

IN a book published sixteen years ago, Dr. Louis Bell wrote: "The commonest failings in the present methods of lighting are the tendency to use too brilliant radiants, and to make up in quantity what is lacking in quality. More study of the practical conditions of lighting, and less blind faith in bright lights would generally both improve practical illumination and tend to economy." If Dr. Bell were writing those words to-day, he could have strongly underlined them. Since 1903, the gas-filled lamp has come (which has been generally known by the pseudonym of the "half-watt"); and the "brilliant radiants" of which Dr. Bell speaks have in it become intensified in brilliance [estimated at over 3000-candle power per square inch] three or four times that of the tungsten filament lamp. As the latter lamp is several times beyond the limit of brilliance to which the eye should be exposed, so the gas-filled lamp has a brutal forcefulness in eye-harming effect which necessitates its concealment, and the use indirectly of its light. This is the view of men of science who study these matters; it is the view of illuminating engineers who do their work scientifically. There is in short genuine alarm on the part of such men over the crude manner in which the lights are being applied—in most cases simply displacing lamps of lower intrinsic brilliancy, and utilizing the same fittings. Mr. F. W. Willcox is making a stern fight against this, as was seen in a paper he recently read before the Illuminating Engineering Society. It might be charged against him (but it would not be true) that his interest lies in the fact that he has fittings for sale for indirect or semi-indirect lighting. His interests are almost purely electrical; but his frankness in condemning the naked use of such lamps under all circumstances disarms any criticism that might be levelled against him in respect of not being altogether commercially disinterested. Everybody who has investigated this question of the effect of high intrinsic brilliancy lights upon the eyes knows that his attitude in the matter is perfectly genuine, and that it is an unpardonable offence against moral responsibility for any electrician not to use all the influence in his power to prevent such lights being employed naked.

Eye-Wrecking Gas-Filled Electric Lamps.

The value Mr. Willcox sees in the gas-filled electric lamp is, in respect of interior lighting, as an adjunct to the indirect or semi-indirect systems of illumination, and for other purposes with proper screens and fittings. In other words, the economy of the lamp in regard to consumption admits of the more scientific treatment of illumination by adapting to it proper fittings. The indirect or semi-indirect systems of lighting were in use with ordinary metallic filament lamps before gas-filled lamps appeared. But to secure illumination by these systems meant a loss of the efficiency credited to the lamps tested naked; and therefore, to get sufficient light with these systems, it was necessary to use higher power lamps, which meant more current to be paid for. This is obvious. Light cannot be thrown on to a ceiling, and then reflected downwards without some expenditure or loss of light. Moreover, as the illuminating value of a source of light is subject to the law of inverse squares, the higher a lamp is placed the lower the value of the light at any given horizontal plane. The gas-filled lamps with their higher efficiency (tested naked) provide a means of using the indirect or the semi-indirect systems of lighting without—speaking approximately—any greater cost for current than would be incurred by using direct the ordinary metallic filament lamps. This is where the value of the newer lamps comes in for internal use. Mr. Willcox favours the use of the larger units of these lamps, and the discarding of small units of other types—that is to say, the former being applied as he recommends them to be. If properly applied, with correct fittings, there is not a field of illumination, in his opinion, where they cannot be used—domestic, shop, factory, and street. The question of cost comes in, particularly for householders. The major part of the community cannot afford to pay the cost of having their installations rearranged, and to incur the expense of utilizing the lamps and fittings that are recommended by illuminating engineers who scientifically pursue their calling. Commonsense must rule; otherwise the electricity industry will be doing itself more harm than good—to the benefit of the gas industry, which has the best quality and most innocuous light for direct use.

The Lamp Must be Correctly Applied.

There are other points. The gas-filled lamps are costly; and as they descend in power per unit, the efficiency decreases. We were glad to see the general protest that was made by the electricians who heard Mr. Willcox's paper against the use of the nominal term "half-watt" lamp. It is no more true to say that the efficiency of the lamp is 1 candle-power-hour per half-watt than it is to say that the efficiency of the metallic filament lamp is 1-candle-hour per watt. The electricity industry, through certain of the lamp makers, have always, the photometer has proved, been guilty of misrepresentation in this respect. And, what is more, there is appreciable variation from the best efficiency obtained with lamps of the same class. This has been proved over and over again with lamps bought

Life of Gas-Filled Lamps.

over the counter, and by the same makers. There were also several admissions made during the discussion as to the life of the gas-filled lamps. Mr. Haydn Harrison spoke of his records for these lamps being very variable in street lighting. The war was blamed, and so was the glass. The use of gas-filled lamps on the existing arc lamp standards—which make no provision for vibration, and so allow the lamps to swing by day and break by night—is also accused of being a contributory cause of bad experience. We would suggest to our electrical friends that part of the difference in life is due to the greater physical strain to which the lamps are put. Despite the use of an inert gas in the bulbs, the higher temperatures at which the filaments have to be run—thus subjecting the lamps to a greater variation than the lower efficiency lamps between minimum bottom temperature when not in use and maximum temperature when in use—in our opinion accounts for the more frequent failures of these expensive lamps. The reason for this opinion is that in a room in which smooth running machinery is operating, in which there is vibration, but in which the temperature is always fairly high, a gas-filled lamp has given an excellent life; while in other places on the works where there is greater exposure of the lamps to variable atmospheric temperature, though less vibration, the life of the same type of lamps is shorter. Mr. Willcox puts the average life of the lamps at 800 hours, and states that in many cases they stood 1000 hours. In abnormal cases, lamps have been known to run 2000 hours. These figures show that there must be quite a substantial number of lamps that have run for a less number of hours than the average of 800 hours. We assume, too, that Mr. Willcox's figures refer to the use of the lamps in interiors, and not to those subject to the rigours of street use. But assuming his average of 800 hours applied to streets, this would mean that, for the 4327 hours per year on the all-night lighting scale, about 5·5 lamps per annum per point would be required. The cost of energy is one thing; the cost of expensive lamps to obtain a reduction in the expenditure on energy is quite another. But the two things must be taken together. Anyway, lighting engineers who are responsible for electric street lighting are welcoming the gas-filled lamps in place of the jumping, capricious, and labour-claiming arc lamps, the use of which on the streets has very noticeably diminished. This is a reason why we so frequently see the incongruity of a stalwart arc lamp pillar supporting fragile units of gas-filled lamps, which is as bad as employing an elephant to pick up pins.

The Ill-Balanced Bill.

There are many things which it will be necessary to compose in the Government Electricity Bill. It discloses, as we have before pointed out, a want of imagination and a sense of justice, as well as a disagreement between points that are proposed to be enacted. The transfer, for instance, of a generating plant and transmission lines for a sum of money representing the outstanding capital is not fair to those who have subscribed the capital—whether in the shape of loans or as ordinary stock or shares. The money is an integral part of the business; and its return at par to-day would not compensate the holders of the capital in a good paying concern, who would not be able to re-invest it so as to produce for them the same return. There would be small consolation to them in the fact that the dismembered undertaking with part of its capital released was to be supplied by the district boards with current at the same price as that at which the old generating plant (up to its productive capacity, and taking into consideration prevailing costs of coal, materials, and labour) could send current into the distribution system. This would not help the liberated capital; and it does not improve the position of that which remains. It merely maintains the *status quo* in respect of generating costs. This raises another point. Stations are going to be disbanded by the district boards resulting in unproductive capital, money (expressed in millions) which is dearer to-day than before is going to be spent on materials, plant, and labour (which are also much dearer than before) for the building of new super-stations and transmission lines; the Electricity Commissioners and the district boards, with their offices and staffs, are going to cost money. Is all this expense to be borne by the additional sales of current by the district boards because they are to make both ends meet? It cannot go on to the current generated to the capacity of existing generating plants, because that is already promised at prices consonant with the capabilities of the plant. The Bill will require a lot of adjustment and modification before it is brought down to a just and sensible basis, with its many elements well balanced.

A Breach of Faith with the Investor.

It is considered by many men in the industry that the proposals of the Bill are a breach of faith with investors. Mr. J. B. Braithwaite is Chairman of three important electricity companies supplying current in London; and he has drawn attention to the matter in a letter to the "Financial Times." The Electric Lighting Act of 1888 gives the companies 42 years' tenure. The purchase of the undertaking by the local authority of the district served was provided for. The terms of purchase were such, first, that where a part only of the undertaking was purchased, as proposed under the Bill, loss occasioned by severance was to be paid; secondly, that the purchase price was to be the fair market value at the time of the purchase. The Bill as drafted constitutes a three-fold breach of the parliamentary bargain under which the capital of electrical supply undertakings throughout the country has been subscribed: (1) In providing for the purchase of the generating station apart from the distribution system without any compensation for severance. (2) In providing that the actual cost of the generating stations less depreciation should be the purchase price, instead of their fair market value at the time of the purchase. Their value has largely appreciated, taking present-day constructional costs into account. (3) By anticipating by twelve years the date of purchase provided for in the 1888 Act, without any compensation. There is another point so far as the London companies are concerned. Under the Act of 1908, which substituted the London County Council for the individual borough councils as the purchasing authority, it was provided that, if the Council exercised its right of purchase in 1931, it must not buy one company and leave another; but, if it purchased at all, it must purchase the undertakings of all the companies. Under the present Bill the District Electricity Board is not even bound to buy all the generating stations and transmission lines within its area. A company that had only been granted by Parliament a small area in which to supply electricity, and consequently had a small and relatively uneconomical generating station, might have its district invaded and its business taken away from it without receiving any compensation whatever even on the partial and inequitable terms provided in the Bill. The iniquities of the measure are being discovered at a rapid rate.

Tariff Reconstruction.

"Meteor" of the "Electrical Times" considers that the time has now arrived when the whole question of electricity tariffs might be reconsidered; and he suggests that an attempt to place them on a sensible foundation should be made by a Committee of the Institution of Electrical Engineers. The making of tariffs has been a sort of hobby with some of the responsible managers of electric supply undertakings; and they have compiled them with such persistency that brought together they would make a mighty tome. One of the beauties of them is that few electricity consumers understand them all. "Meteor" tells the truth as to why charges diverge so largely in electricity supply for energy for different purposes. He is "quite prepared to admit that, though nominally a single uniform article is sold—viz., electric energy—really it is light, heat, power, chemical energy, and so forth that the consumer buys, and that the degree of competition in these various fields differs. This is, of course, a point of great importance which must be taken into account." So competition accounts for cut-prices, and even then the electrical industry fails to suppress the competition, and in some lines to make any real progress. Another thing he does not greatly approve of is the percentage addition made to electricity accounts during wartime. He thinks that the present prices of materials and labour will show considerable staying power; and therefore there is something to be said for increases on the half-penny and penny basis.

Estimating Phenol in Tar Oils.

Some notes on the estimation of phenol in tar oils are contributed to the Journal of the Society of Chemical Industry by Mr. G. Campbell Petrie, who records his thanks to Dr. Percy E. Spielmann for his continued interest, and for the valuable advice which he has given during the preparation of the paper. A number of experiments were carried out to compare the different methods now in use for the estimation of phenol in fractions from coal tar oils, with a view to devising a more rapid method. It was decided to experiment with the method of Fox and Barker, and to shorten this, if possible. The experiments indicated that calcium chloride was not a satisfactory agent for drying. When the crude phenol acids, washed to remove sulphuric acid and containing ether, are dried over this substance, an obstinate sludge is formed. Difficulty is also experienced in washing the phenol acids free from sulphuric acid. If this process is not complete, the phenol distillate will be contaminated with hydrochloric acid, owing to small pieces of calcium chloride being transferred with the viscous liquid to the distillation flask. The method adopted to obviate this is described—the crude acids containing ether being distilled without drying, and the ether and water distillates collected separately. As the result of tests, it was seen that neither calcium chloride nor two other substances tried—plaster of Paris and anhydrous sodium sulphate—extracts all the moisture from phenolic mixtures. The ether used for washing the sulphate liquor was replaced by benzol; and after giving an account of the work done, the author says it remained to choose between drying with an agent which would give a high result, and eliminating the water with benzol by distillation and careful exclusion of moisture afterwards. The latter procedure is much quicker, and seems to be justified.

French "Professional Syndicate."—We have received a volume containing all the literature distributed to its members in 1918 by the French "Professional Syndicate of the Gas Industry." It shows that a very large number of circulars were issued during the year, conveying and collecting valuable information on a variety of subjects—gas and coal prices, legal and technical questions, &c. On many occasions copies of the leading newspapers were sent to members when they contained articles of interest to the gas industry.

THE UTILIZATION OF GASEOUS FUEL IN COMMERCIAL PRACTICE.

WITH CONSIDERATION OF THE TYPES OF GAS-FIRED FURNACES AND METHODS FOR THEIR CONTROL.

By F. W. EPWORTH, of the Richmond Gas Stove and Meter Company, Ltd., of Warrington.

[The Essay that Won the Hadfield £100 Prize, Adjudicated upon by the Society of British Gas Industries.]

(*Concluded from p. 759.*)

CONSIDERATION OF TYPES OF GAS-FURNACES.

Gas-fired furnaces may be grouped under three main headings:

(*a*) Natural draught furnaces.
(*b*) Forced draught furnaces.
(*c*) Compressed gas and air furnaces.

Each of these has its subdivisions, giving the following fairly complete scheme, which permits of the placing of any furnace in its correct group.

1.—NATURAL DRAUGHT.

(*a*) Low-pressure gas + primary air + secondary air.
(*b*) Low-pressure gas + primary air (secondary air only if required).

2.—FORCED DRAUGHT.

(*a*) Low-pressure gas + primary air only (compressed).
(*b*) Low-pressure gas + primary air (compressed) + controlled secondary air (not compressed).
(*c*) Low-pressure gas + primary air (compressed) + unlimited secondary air.

3.—FORCED DRAUGHT AND COMPRESSED GAS.

(*a*) Compressed gas + compressed air (mixed).
(*b*) Compressed gas + compressed air (separate).
(*c*) Compressed gas + compressed air (mixed) + secondary air.

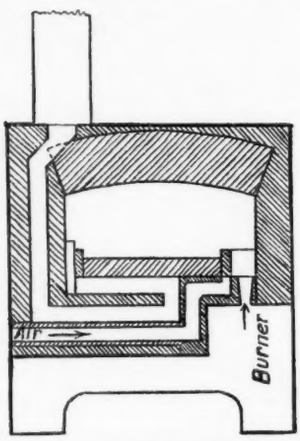


Fig. 1.—Section of Reverberatory Oven Furnace.

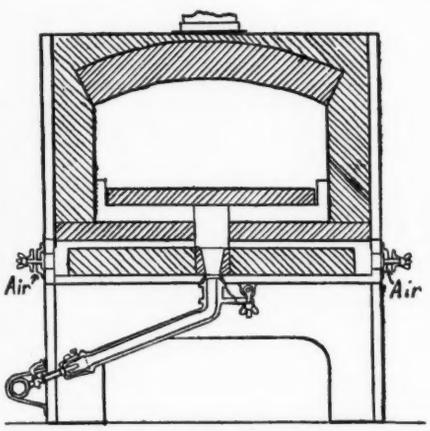


Fig. 2.—Cross Section of Oven Furnace, Regenerative Type.

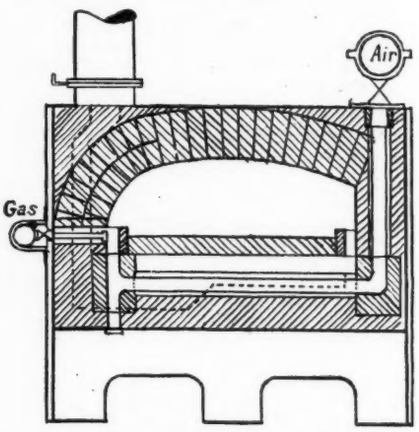


Fig. 3.—Section of Low-Pressure Gas and Air Oven Furnace.

The distinctive features of the various type will become more apparent after a consideration of examples of the same.

TYPE 1*a*.—Natural Draught Furnace with Low-Pressure Gas, Primary and Secondary Air.

Natural draught reverberatory ovens (fig. 1) or muffle furnaces form examples of this class. An examination of the sketch shows the general principle of this type. Briefly, the gas along with the primary air enters the combustion chamber, where it meets the secondary air that has been preheated by passing along the furnace bottom. Certain types of crucible furnace may also be included under this heading.

TYPE 1*b* (1).—Low-pressure gas and primary air.

It is manifest that by shutting-off the secondary air port-holes of the 1*a* types of furnace, the 1*b* type is obtained. It is convenient to consider it as a separate type, since it is used in this condition for many practical operations.

TYPE 1*b* (2).—A different furnace, but grouped under the same heading is the natural draught regenerator oven or muffle furnace (fig. 2). The distinction between these and the reverberatory is mainly one of construction. In the regenerator type, the bunsen burners enter the combustion chamber. Again, the secondary air enters the furnace by a passage under the floor, thereby ensuring preheating; and in this case it surrounds the walls and roof, giving an evenly diffused radiant heat. Temperatures of from 800° to 1300° C. are easily maintained constant.

TYPE 2*a*.—Forced draught furnaces with low-pressure gas and primary compressed air.

In the low-pressure gas and air furnaces (fig. 3) the whole of the air that is supplied for combustion is heated, so that the usual bunsen burners (with their secondary air supply) are unnecessary. Combustion is so near to perfection that no excess of air is required; and, consequently, no heat is lost thereby. Gas at ordinary pressure enters from a series of tubes. Air at 2 in. (water) pressure enters from a similar series of tubes, and travels down the side and along the bottom of the furnace—*i.e.*, is preheated in the fireclay tubes through which it passes. It then meets the gas, and combustion takes place. The products pass under the furnace before entering the flue; the air for supporting combustion being preheated by the waste products. A reducing atmosphere can be obtained by diminishing the air supply.

The well-known gas and air-blast crucible furnaces (fig. 4) are also instances of this type of furnace. Of course, to obtain efficiency, the air and metal must be preheated. This applies particularly in the treatment of metals or alloys of high melting point. [Refer to Thornton and Hartley, "Metal Melting," Institute of Metals, 1917.]

TYPE 2*b*.—Low-pressure gas + primary compressed air + controlled secondary air.

At present this is a purely theoretical type; there being no example on the market of a furnace of this type with adequate secondary air control.

TYPE 2*c*.—Forced draught. Low-pressure gas + primary air (compressed) + secondary air.

The earliest crucible furnaces (fig. 5) came under this heading, and are still met with. The secondary air is relatively uncontrollable and unlimited. Similarly, many blast-oven furnaces at present on the market come under this heading (fig. 6).

TYPES 3*a* and 3*b*.—Forced draught and compressed gas—separate or mixed.

The type in which compressed gas and compressed air meet in the burner is the ordinary crucible pattern of furnace. With mixed compressed gas and air supplied direct to the burner, there are at present only two patterns on the market. It is necessary to have a gas and air mixer installed. The Selas-Turner mixer is suitable; and it is claimed that a 5 : 1 air to gas mixture can be supplied and burned with safety. In this case, the whole of the air is naturally primary air. The danger to be faced when working with such a mixture is the possibility of explosion in the mains due to back-firing. Isolated instances of this have occurred.

TYPE 3*b*.—Compressed gas + compressed air + secondary air.

This is the usual type of furnace used in conjunction with a gas and air mixer of the Selas-Turner type. The secondary air is admitted at port-holes in the burner.

It will be evident from a consideration of the first part of this paper, that economy and success in the use of gas for industrial heating is dependent upon the use of the correct ratio of air to gas. Excess of gas is waste, except in certain special operations; and clearly excess of air leads to waste of heat, by increasing the loss by the flue, and by depression of the flame temperature in the furnace.

The amount of air required for complete combustion depends on the nature of the gas [see Table VI., *ante*, p. 756]. The richer

the gas, the greater the amount of air required for complete combustion.

Difficulties with Regard to Measurements.

(*a*) Variations in the composition of the gas will affect the quantity of air necessary for the maximum efficiency in the combustion of a given volume of the gas.

(*b*) Similarly, a change in density will take place, and the latter will affect readings based on the velocity of the gas flow.

(*c*) A change in calorific value will result, and lead to similar trouble as with (*a*) above.

Another difficulty is experienced with regard to "sampling"—owing to the presence of "stream lines."

Methods for Control or Measurement of the Gas and Air Supplies.

At the outset it must be stated that, after experience with gas-fired appliances, it is possible to effect gas and air adjustments to a nicety. Whether such assessments are quite accurate is a moot point, in the absence of reliable instruments indicating the maximum efficiency of the combustion.

As gas-fired appliances are certainly handled in the main by inexperienced workers, the need for an indicator becomes apparent. Such an indicator must be capable of giving clear and direct readings, capable of interpretation by a workman, and of standing the wear and tear of works' use. It will be advisable to give a summary of appliances—the aim of which is to effect the automatic control of the gas and air mixture, or to indicate the efficiency of the combustion—which are on the market at the present time.

Automatic Regulation of the Gas and Air Supply.

Possibly the best appliance on the market is the "Keith-Blackman Automatic Mixture Controller." In this, the flow of the air governs the gas-rate, irrespective of variations of pressure in the air-blast, and the gas pressure or the resistance to the mixture, whether in the nozzle, the furnace, or the flues. It maintains a constant control, but does not supply the most efficient mixture—that has to be judged in the initial setting.

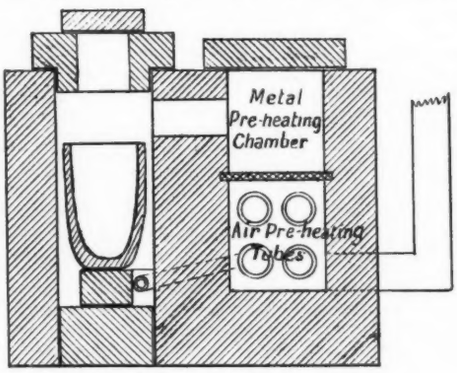


Fig. 4.—Gas and Air Blast Crucible Furnace (Cross Section). Metal and Air Preheated by Hot Products.

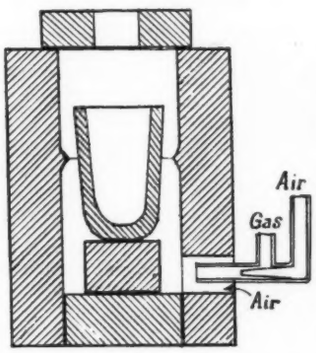


Fig. 5.—Crucible Furnace (Cross Section).

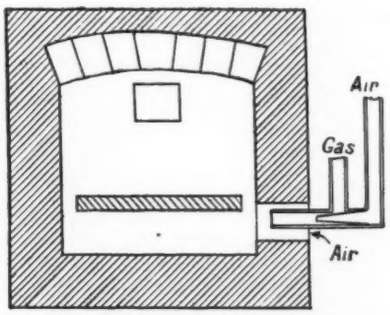


Fig. 6.—Blast Oven Furnace (Cross Section).

The "Selas-Turner Patented Mixer" automatically stabilizes variations in gas and air pressure, and delivers definite volumes of gas and air, mixes them, and gives a rough indication of the thermal value of the mixture by means of an indicator light (a blue flame from a pilot Méker burner). It will be seen that this bears a resemblance to the Keith-Blackman system, and can be used for 1 : 5 mixtures of gas and air. In actual practice, it is customary to use smaller proportions of air in the mixture, and to supply the excess air required from secondary-air port-holes in the burners. The pilot light (the length and appearance of the flame of which gives an approximate indication of the proportions of air and gas in the mixer) is fitted after the mixer, but prior to the admission of any secondary air at the burner. This is presumably necessitated by the difficulty of continuously removing a sample from the burner itself without any interference with the latter.

The two systems above outlined are successful, inasmuch as they ensure the delivery of a constant supply of either gas and air or a mixture of both (in the case of the Selas-Turner system); but from a practical standpoint they both fall far short of perfection, as there is no indication of the correct mixture to be supplied for maximum efficiency in combustion.

The present devices for indicating the efficiency of the combustion proceeding may be grouped under two heads: Optical indication, and measurement of gas-air ratio.

Optical Indication.

Under this heading should be included the observation of the actual flame obtained on combustion in the furnace. Observations of this nature are necessary before "setting" the Keith-Blackman adjuster; and though the pilot light to some extent obviates it in the Selas-Turner system, if (as is usually the case) secondary air enters after the position at which the pilot light is fixed, it becomes necessary in the case of this system too.

The Ionides system is based on the assumption that an incandescent mantle gives its maximum illumination with the correct mixture of gas and air—*i.e.*, if the graphs be plotted for temperature obtained and light emitted by an incandescent mantle with the same gas-air mixture, the crests of the two curves will attain the same maximum (fig. 7).

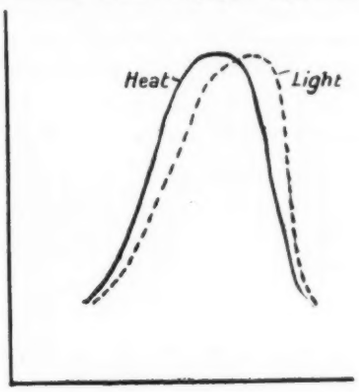


Fig. 7.

Measurement of Gas and Air Ratio.

This is usually determined by Pitot tubes in conjunction with a differential gauge. The principle of the Pitot tube is well known; and the main difficulty of a cheap and reliable gauge (to replace the Threlfall gauge consisting of fine micrometer adjustment, &c., and consequent high price) is well in hand. The difficulty to be contended with is that the pressure difference between the static and dynamic pressures is exceedingly small. A cheap and efficient gauge used for twelve months in the Research Department of Richmond's, at Warrington, consists of two reservoirs containing two immiscible liquids of close specific gravity in communication, *vid* an inverted U-tube. The levels in the two bottles are so adjusted as to bring the junction meniscus of the two liquids on to the scale—both reservoirs being at atmospheric pressure. They are then placed in communication with the Pitot tube.

The following are readings obtained with the gauge, the nature of which is apparent from fig. 8—p. 806.

Gas Rate of Flow in C.Ft. per Hour. (Checked by Metering.)	Reading on Gauge in Inches Movement of Meniscus Junction.
201	0·84
252	1·25
369	2·60
427	3·41
463	3·96
532	5·33
572	6·15
692	8·77

Criticism of Automatic Control and Gas-Air Ratio Indicators.

The automatic control, as already stated, is only reliable if the correct mixture has been obtained initially. Variations in the composition or density of the gas are not compensated. Any device indicating the nature of the combustion proceeding would be of great value in conjunction with the automatic control.

Gas-Air Ratio Indicators.

So far as optical methods are concerned, these rely on the personal factor—*i.e.*, the observation and experience of the worker.

The objections to the system are numerous. In the first place any alteration in the density of the gas affects the Pitot tube

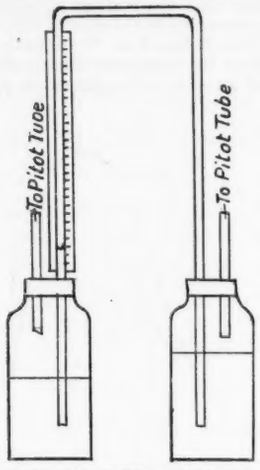


Fig. 8.—Simple Differential Gauge.

readings. So far as the gauge is concerned, the following points have been proved in the Research Department of Richmond's, at Warrington:

(*a*) Variation in the temperature of the gauge liquids affects the specific gravity of the two liquids differently—*i.e.*, the specific gravity difference of the two liquids alters. For instance. olive oil and 35 p.ct. alcohol water mixture having specific gravities of ·914 and ·948 at 63° Fahr., at 85° Fahr. have specific gravities of ·905 and ·9405 respectively, and give quite different readings on the gauge at the two temperatures. Water jacketing of the gauge might overcome this difficulty.

(*b*) It has been noted that, with continued use, the position of the zero on the scale alters. This phenomenon was styled "zero creep," and may be due to partial and varying solubility of the two so-styled immiscible liquids. In connection with the Pitot tube, it has been noted that this is liable to become clogged with dust or oil mechanically conveyed in the pipe-lines.

Suggested New Methods of Indicating the Nature of Combustion

(*i.e.*, ascertaining when the mixture being burned is of maximum efficiency).

It seems preferable to adopt some indicator that will be unaffected by changes in the composition or density of the gas. The following seem, from a theoretical and practical standpoint, to be improvements on the present indicators:

A.—A conical tube would clearly serve as an indicator by merely lighting a sample issuing. As the mixture was altered in gas-air ratio, the flame would travel along the tube. The position indicating the maximum efficiency in combustion would lie near the throat. The practical objection to such a device is that the tube will get heated by the flame, and thereby the position of the maximum efficiency flame will alter. It would seem probable that water-jacketing might overcome this trouble.

B.—Another means of obtaining the efficiency maximum would be furnished by sparking samples of the mixture. Plotting the contraction on sparking, against the percentage of air and gas, a curve of the following type is obtained—(fig. 9). In designing the

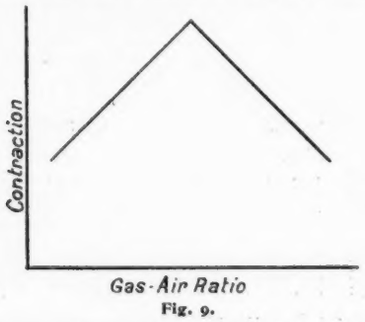


Fig. 9.

apparatus, it would be necessary to include a bye-pass for the continuous sampling of the gas, and also a gauge to indicate the contraction. An instrument based on this principle would have the undoubted advantage of being free from Pitot tubes, and being compensated for density or calorific-value changes of the gas.

[The author wishes to thank the Richmond Gas Stove and Meter Co., Ltd., for permission to insert diagrams of their furnaces in this essay.]

SIXTY YEARS AGO.

[From the "Journal" for June, 1859.]

Gillard Gas.—We have before had occasion to notice that there seem to be fixed periods for the return of exploded projects, as there are stated times for the return of meteors and comets. They shoot across the horizon with splendid luminosity. They attract for a brief interval the notice and wonder and admiration of the crowd of gazers, and then vanish, and are supposed to be extinguished and gone for ever. But in the fulness of time, the same meteors come back to startle us again from our propriety; and after attracting attention for awhile, they once more disappear, and are forgotten. Gillard's water and platinum gas belongs to this class of planetary aerolites. It first attracted observation about ten years ago, when it was greatly admired for its splendour, and for the sun-like character of its light; but it was gradually lost to sight. About five years afterwards it re-appeared for a shorter space of time, and was then extinguished without having produced much sensation. True to its calculated quinquennial periodicity, the Gillard light has again arrived; and though not visible at Greenwich, it may be seen shining with great steadiness and beauty at the foot of Highgate Hill.

M. Gillard's attempt to apply the gases obtained from the decomposition of water to the production of artificial light by burning them in contact with platinum wire, was eminently calculated to excite attention as a pleasing experiment. The incandescence of the cage of platinum wire that surrounds the hydrogen flame is steady and intense; and as the chief material employed for the production of the gas costs nothing, the days of coal gas seemed to be numbered, and a new epoch in artificial illumination was supposed to have commenced. The public papers and our own "JOURNAL" teemed with notices of the new light. But notwithstanding all that was said in its favour, and despite of its beauty and brilliancy, there was only one establishment in this country where it was put in practical operation. The works of Mr. Kurtz, a manufacturer of chemical products, near Manchester, were lighted with Gillard gas; and there its merits were carefully examined by some of the highest authorities in the scientific world, who were somewhat reluctantly compelled to admit that the cost of the "cheap" light is considerably greater than that of coal gas, and consequently that this plan of illumination is, from a commercial point of view, impracticable.

We have had the opportunity of examining the apparatus as now constructed for the generation and purification of the hydrogen gas, at the experimental gas-works recently erected near the Archway Tavern, at Highgate. It does not materially differ from the apparatus ordinarily used for the production of coal gas, with the addition of a steam-boiler, and tubes for conveying the steam into the retorts, where it is injected from a number of small holes on to incandescent charcoal. The water is thus decomposed, and the resulting gases are hydrogen mixed with carbonic acid and carbonic oxide. The gas is freed from uncondensed steam by passing through a refrigerator, and from its carbonic acid by contact with caustic lime in a dry-lime purifier, the residual hydrogen and carbonic oxide being conducted to the burners for combustion. The gas issues from an argand burner without chimney; and the flame is surrounded by a network of small platinum wire eight-tenths of an inch high, and about five-eighths of an inch in diameter, which becoming intensely heated by the hydrogen flame, produces a light resembling in purity that of the sun, and remarkably steady. Such are the apparatus and the results obtained from it, and nothing can apparently be more satisfactory. But when we examine carefully the cost of the light and some of its peculiarities, the seeming advantages will entirely disappear.

IRON RETORT CARBONIZATION.

The Greene-Laucks Patents.

An experimental installation of low-temperature carbonization plant put down for the Denver (Col.) Bye-Products Company, under the Greene-Laucks patents, and recently started to work, has been described in the American "Coal Age."

The retorts, which are in batteries of four, are made of cast iron, about 18 in. diameter and 18 ft. long, and are set on end. A spiral fin is cast on the outer surface of each retort; the retort being encased in a fire-brick setting. The fin serves the double purpose of breaking-up the currents in the ascending heating gases, and materially assisting in absorbing the heat and transmitting it to the contents of the retort. Ground coal is fed continuously into the top of the retort, mounted centrally within which is a hollow-stemmed worm, revolved slowly by machinery. This worm both agitates the coal charge and forces it downward. The gases evolved in carbonizing pass through openings into the interior of the worm. The top of the worm-shaft passes through a stuffing-box, then through the driving gear; and its end is connected to a piping-system in which a vacuum of approximately 24 in. is maintained. The principle on which the Greene-Laucks process is based is that the higher the vacuum maintained in the coking-chamber, the lower the temperature that will induce complete carbonization. The temperature within the retort seldom, if ever, exceeds 1200° Fahr. Gas-burners between the retort and the fire-brick setting furnish the heat required.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Meeting at the Grangetown Gas-Works, Cardiff.

THE extra meeting of the Institution which it was promised should be arranged, consequent on the afternoon of the May meeting being occupied by the District Conference of the British Commercial Gas Association, took place last Thursday at the Grangetown Gas-Works, Cardiff—under the presidency of Mr. REGINALD G. CLARRY, the Engineer, Manager, and Secretary of the Swansea Gas Light Company.

A little formal business and two discussions were followed by an inspection of the works and tea.

There was a fair attendance of members at the meeting, for which a large room in the stores had been suitably fitted up.

MINUTES OF THE LAST MEETING.

The HON. SECRETARY (Mr. Octavius Thomas, of Pentre) read the minutes of the last meeting; and they were confirmed.

NEW MEMBERS.

Proposed by Mr. E. REES (Port Talbot), seconded by Mr. W. C. JACKSON (Neath), the following were elected members of the Institution: Mr. H. J. Philpot, of Cinderford; and Mr. Alfred Goodes, of Coleford.

CARDIFF TECHNICAL COLLEGE AND CHEMISTRY.

The HON. SECRETARY said the next business was the election of a member to serve on an Advisory Committee for industries depending largely upon chemistry, in connection with the Cardiff Technical College. The Technical Instruction Committee of the Cardiff Technical College, subject to confirmation, in order to bring about a closer relationship between the Technical College and industry, decided to appoint an Advisory Committee for industries depending largely upon chemistry. The Committee would consist of fourteen members, seven from the Technical Committee, and seven from the industries. In this connection, one representative was allotted to the gas industry; and it was felt that Mr. H. D. Madden should act in this capacity.

Mr. J. ROBB (Chepstow) remarked that this was a very important matter. They required a man on the Committee who was thoroughly versed both in mechanics and in chemistry, and who would be able regularly to attend the meetings. Therefore he had pleasure in proposing that Mr. Madden should be their representative.

Mr. J. H. CANNING (Newport) seconded, and expressed the opinion that no better selection could be made.

The proposal was warmly supported by Mr. REES, and unanimously agreed to.

The HON. SECRETARY said the Council of the Institution of Gas Engineers had decided to appoint a Committee to consider and report upon the subject of technical education in the gas industry, and to invite each of the affiliated District Associations to appoint a representative to serve on the Committee. The business would include consideration of the notification from the City and Guilds of London Institute that, with a few specified exceptions, all their examinations in England and Wales lower than the final would be abandoned. The Council of the Wales Institution recommended that Mr. E. H. Swain, of Pontypridd, should be selected for the Committee; and he proposed this.

Mr. JACKSON seconded.

Mr. REES said he wished to propose an amendment—not because he did not consider Mr. Swain to be a proper representative, but more as a matter of principle, and for the particular reason that their Institution had in the late President a representative on the Executive Council of the Institution of Gas Engineers. Inasmuch as it had been the practice in the past for their appointed representative to represent the Institution on any additional Committees that might be appointed from time to time, he moved that the present representative—that was, the late President—be asked to represent them in this connection.

The HON. SECRETARY: We already have three representatives on the Institution.

Mr. H. D. MADDEN (Cardiff) said he would like to throw a little light on the matter, so that the members might be quite clear with regard to the work of the Council. The Institution Council itself met from six to eight times a year as a Council; but there were a number of Committees formed from the Council who met at additional times—which would no doubt obtain in this case. Outside the work of the Council, the duties of the Educational Committee would doubtless involve extra attendances. This should be made quite clear.

Mr. J. MOGFORD (Briton Ferry) said he thanked Mr. Rees for proposing that he (Mr. Mogford) should act on this Committee; but he already represented them on the Institution and on the National Gas Council, and this kept him pretty busy. He understood this Committee required a distinct representative, apart from those they already had on the Council. In any case, the honours should be shared round; and he would like his name withdrawn.

Mr. REES thereupon withdrew his amendment; and Mr. Swain's proposal was agreed to.

WAYS AND COMMUNICATIONS BILL AND GAS SUPPLY.

Mr. MOGFORD then presented some remarks on the "Ways and Communications Bill and the Gas Supply in Industrial Areas," which had been prepared for the last meeting, but which there was then no time to submit. They will be found on p. 808.

CARBONIZING PLANT AND GAS QUALITY.

At the May meeting [see "JOURNAL" for May 13, p. 362], a discussion was opened by Mr. J. H. CANNING (Newport) on the "Most Suitable Standard Quality of Gas;" and the consideration of this was adjourned until the present occasion, when Mr. H. D. MADDEN (Cardiff) contributed some remarks on the "Carbonizing Plant of the Future and the Gas Best Suited to the Consumer."

The PRESIDENT suggested that, as the two subjects were very similar in character, the discussions might be taken together. This was done; and the report appears on p. 809.

VOTES OF THANKS.

Mr. REES proposed a vote of thanks to those who had opened the discussions.

Mr. MURRAY seconded this; and it was agreed to.

Mr. A. J. BOND (Aberavon) proposed that the best thanks of the Institution be given to the Chairman and Directors of the Cardiff Gas Light and Coke Company for the use of the room in which to hold he meeting, and for their hospitality.

Mr. T. E. FRANKLIN (Barry) seconded this; and it was heartily carried.

THE GRANGETOWN WORKS.

The business concluded, a pleasant and instructive hour was spent in an inspection of the gas-works, under the direction of Mr. George Clarry (the General Manager) and Mr. H. D. Madden (the Engineer), who were assisted by Mr. A. E. Williams, Mr. F. Boardman, and Mr. J. Parry. It is some five years since the members last inspected the Grangetown works; and much has been accomplished there in the meantime—in spite of war conditions. There is, too, at present quite a lot of work in progress, which lent peculiar interest to the visit.

Among what may be termed strictly war work may be mentioned the following: (1) The conversion of the tar dehydrating plant for debenzolizing washed oils by the addition of a dephlegmator column filled with Raschig rings. (2) A concentrated ammonia plant erected during the war to act in conjunction with the existing sulphate of ammonia plants—capacity 20,000 gallons of crude liquor per day. (3) Workshops erected for instructional purposes and for the training of munition workers. Royal Air Force mechanics have been passed through this school, which contains a very full equipment of all types of machine tools.

With regard to new extensions, various constructional work had been started immediately prior to the war, and completed and brought into action during the war period. Four acres of new land have been incorporated, and a new boundary wall and public pathway have been laid out. This land was acquired for works extensions, permitting the erection of a new gasholder, concentrated ammonia plant, coal stores, &c. A 2½ million c.ft. per day Glover-West vertical retort installation has been erected, with hydraulic coal-wagon tippers and electric telpherage for coke handling. Also an electric power plant (four generator sets). Then a holder of 3¼ million c.ft. capacity has been put up. During the later war period, the two original sets of carburetted water-gas plant were remodelled, with the object of increasing manufacturing capacity. The new capacity is 1½ million c.ft. per day each set. Two new boilers and a stack have been added to the main boiler-house, for additional steam productive power. Two compressors, 50,000 c.ft. per hour, have been laid down at the Bute Terrace works, and a new station governor installed upon the outskirts of the Roath district.

The work now in hand includes the re-modelling of the coal-handling plant, stoking machinery, and settings of No. 2 retort-house. This house contains forty beds of eight through retorts; and it is being equipped with two Fiddes Aldridge stoking machines. There will be 12 cwt. charges. A set of Graham type condensers is in course of construction for the carburetted water-gas section extension, to deal with the increased capacity brought about by re-modelling. A new artesian well, 427 ft. deep, is under test, and just being completed. A new "Draper" coke breeze washing plant, capable of washing 100 tons of crude material per day, is installed. This "Draper" plant is made by the Rhondda Engineering Company, of Bridgend.

Grangetown is, and has been, a busy works; for there have been annual increases in output during the war period of from 6 to 8 p.ct.; while, on top of these, the increase so far this year has been something like 15 p.ct.

The inspection completed, there was a return to the meeting-room, where tea brought a successful meeting to a close.

Mr. Thomas Fairley, late City Analyst of Leeds, who died early this year at the age of 76, left estate of the gross value of £5456.

The Midland Section of the Coke-Oven Managers' Association have been invited by Messrs. W. C. Holmes & Co., Ltd., to visit their works at Huddersfield next Saturday.

The Council of the Society of Engineers, realizing that association and co-operation are the order of the day, have prepared a scheme for the association of engineering societies. The Gloucestershire Engineering Society were the first to connect themselves with the scheme. Members of associated societies will be entitled to various privileges, and may add after their own title the words: "Associated with the Society of Engineers (Incorporated)."

THE EFFECT ON GAS-WORKS OF THE WAYS AND COMMUNICATIONS BILL.

By J. MOGFORD, of Briton Ferry.

[A Discussion at the Cardiff Meeting of the Wales and Monmouthshire District Institution of Gas Engineers, June 19.]

The Bill to which I invite your attention proposes to establish a Ministry of Ways and Communications, and for purposes connected therewith. It is intended to provide facilities for improving the means of locomotion and transport. To carry out these purposes, the new Ministry would have transferred to them all the powers and duties of any Government Department in relation to railways, tramways, waterways, roadways, harbours, docks, electricity supply, or other undertaking concerned with such matters. Power is also to be sought to control railways temporarily, and for the permanent control of railways, waterways, harbours, and docks by purchase.

These proposals, in so far as they will facilitate transport, should prove advantageous to the gas industry, as any acceleration or cheapening of the transit of coal and other material would tend to lower the cost of production, and cheapen the supply of gas to the consumer.

It is safe to assume that the Bill, as promoted, is part of the national scheme of reconstruction—it is intended to stimulate industry, and increase production. Taking this view, let us examine the probable effect of its proposals on the gas industry. What concerns us chiefly are the powers sought with regard to the supply of electricity. Since the Bill was introduced, these proposals have been deleted; but when they were dropped, an assurance was given that the attention of the house would again be called to them.

We have learned from the daily papers the nature of the proposals. The Prime Minister has told us that it was intended to electrify railways, and provide a cheap supply of electricity for transport and industries. In fact, it requires but little imagination to see that under the Bill it was intended to enact the recommendations of the Committee on Electric Power Supply.

The temporary withdrawal of these electrical proposals should prove the opportunity of the gas industry. No effort should be spared to bring home to the Government Departments, Parliament, local authorities, and the man in the street, the fact that gas supply is the cheapest known means of distributing potential heat-energy in convenient form. Every officer and administrator connected with the industry has his duty to perform. Lethargy should be cast aside, and half-measures forsaken.

There must be no misconception as to the success which has been achieved by the recent propaganda of the virtues of electricity. The publicity given to the report of the Electric Power Supply Committee, the inspired newspaper paragraphs, and the speeches of politicians, have had the desired effect upon the public. The average cottager firmly believes that he will soon be dwelling among Elysian fields, whose corn will be forced to luxuriance by networks of electric lines; that he will have an abundant supply of eggs for breakfast if he fools his hens with a half-watt lamp; that his home will be heated, lit, and cleaned and his dinner cooked, by simply pressing the button; and that he will be conveyed to and from his work in an electric automobile. It will be no small task to dispel this illusion; but an admirable start has been made by Prof. Cobb and Sir Dugald Clerk, and it is the duty of the leaders and the rank and file of the industry to demonstrate to the public that the surest way to coal conservation and national economy is by the distribution of heat-energy in the gaseous form.

Local authorities are being urged by Government Departments to erect dwellings under the National Housing Scheme; and we should lose no time in bringing before such authorities the advantages of a cheap and efficient gas supply. It is generally recognized that for cooking and heating electricity cannot seriously compete with gas; and (repeating what I told you in May, 1918) it is evident that it would be something worse than extravagance if electrical mains were run for lighting such dwellings. Cottages can be lit cheaply and efficiently if provided with burners suitable to the gas used for heating and cooking. There are many buildings where electric lighting is economical for the consumer, and remunerative to the supplier; but the gas-heated cottage is not one of them.

The position that will arise when the super-station electric scheme matures is a question of immediate concern to this Institution. Factory owners are alive to the advantages to be derived from having a cheap supply of electrical energy "on tap," and being able to drive different sections of their works by separate motors. We shall probably be faced by large stations, of some 80,000 K.W. capacity, situated at Swansea and Port Talbot, linked-up to other stations at Treforest and Bargoed. These stations will be connected by lines carrying a 33,000-volt three-phase supply at fifty cycles. Distributing networks will probably have a pressure of 11,000 volts; and the supply will be "stepped-down" to 440 volts for power and 220 volts for lighting.

Our present methods of gas production and supply would stand little chance against such competition, and small concerns would be obliterated. Such an eventuality should be guarded against.

Fortunately the criticisms of Professor Cobb and Sir Dugald Clerk, and the reports of the Fuel Research Board, and the Gas Institution Committee on Coal Conservation have come to our support; but no time should be lost in putting ourselves in a position to adopt the recommendations of these reports, so that what has been termed "the cheapest known means of distributing heat-energy in a convenient form" should be at the disposal of the consumer at a price, and in such form, that it would remain supreme for heating, and more than hold its own for lighting. The distribution of suitable gas at a low price would also settle the question of turbine *versus* internal combustion engine.

I have on former occasions pointed out to you the extravagance which accompanies the use of bituminous coals in South Wales. There is very little hope of improvement without the intervention of a Departmental Commission. Conservatism and parochialism prevent amalgamations that would lead to the distribution of power, light, and heat upon lines suitable to the requirements of the district.

One of the questions originally put to the Coal Conservation Committee was: "What improvements can be effected in present methods of using coal for the production of power, light, and heat, and of recovering bye-products, with a view to ensure the greatest possible economy in production and the most advantageous use of the coal substance?" The report of the Fuel Research Board is a full and complete answer to this question; but an inquiry with the view to adapting present methods in South Wales to the recommendations of the Fuel Research Board would show the need of revolution in industrial practices.

Coal gas is now manufactured in small works and sold at high prices. Coke is made in ovens not fitted for the recovery of bye-products or the economical use of the surplus gas. Boilers are coal-fired, and steam-engines are non-condensing. Large quantities of bituminous coal are used in gas producers for steel smelting; and no thought is given to the valuable bye-products that are being lost.

In the event of the recommendations of the Fuel Research Board reaching the statute book, these practices would have to stop; and the sooner they stop the better for the nation. Gas manufacture would then be recognized as the key to coal conservation; and it would be the business of each of us to see that it kept the place to which it is justly entitled, in the forefront of British industries.

The foregoing notes were written in April. Since our last meeting the Electric Supply Bill has been before Parliament, and its proposals severely criticized. We should, however, bear in mind that it is a Government measure with a strong backing, and will in an amended form be passed into law. The wellbeing of the gas industry depends not so much on the opposition that is put up against the Electric Supply Bill as upon the measures taken to adopt the recommendations of the Fuel Research Board, and for the provision of a cheap and efficient gas supply.

Discussion.

The PRESIDENT (Mr. R. G. Clarry, of Swansea) said they all regarded Mr. Mogford as a pioneer—particularly in electrical matters. Several important points undoubtedly arose out of his remarks.

Mr. E. REES (Port Talbot) said that Mr. Mogford's statement of the case was of particular importance to the smaller undertakings, which formed the majority of the gas-works of the country. At the moment, these smaller undertakings were very badly affected in the matter of price. They could not utilize a ton of coal to the fullest advantage. What they appeared to be up-against in connection with the proposals of the Electricity Supply Bill was that some means must be devised whereby this utilization of a ton of coal to the best advantage could be accomplished, so that the smaller undertakings might be able to distribute light, heat, and power at a price that would brook no competition. It was apparent on the surface that in the matter of the supply stations which it was proposed should be erected South Wales would figure very largely. There were now in erection there several large carbonizing plants—more particularly coke-oven plants—and up to the present time no advantage had been taken of the possibility of utilizing part of their surplus gas for domestic purposes. It might be true that there were certain difficulties to contend with; but they could be easily overcome. The main point that appealed to him was that the question of price was the dominant factor. Take the housing problem in connection with the use of gas. At Port Talbot, there was a project for the erection of 1200 houses, to accommodate something like 2000 men when Messrs. Baldwin's new plant was ready to operate. He had interviewed the responsible architect; and he had found that it was a difficult matter to convince these gentlemen that the gas industry could provide a better service for light and heat for domestic uses than the electricians. They were "electricity-mad," by reason of the propaganda which had been disseminated so strongly by the electrical people. The Institution should take whatever steps might seem to them necessary to combat this propaganda; but it was essential that they should be in a position to distribute gas at a price which would meet all competition. What they had to aim at was a supply of light and energy which would give the consumers complete satisfaction at a reasonable price.

The PRESIDENT said there was no doubt that, if the Ministry of Ways and Communications took over the Bill they would find they had backed a loser; and it might be just possible that, in order to counterbalance the loss to be borne on the electrical scheme, it would be necessary to consider some suggestion in regard to the gas industry.

Estate of the value of £47,750 has been left by Dr. H. J. Strong, J.P., of Worthing, who died last January, aged 86. Dr. Strong was a Director of the Ascot and District Gas and Electricity Company, and of the Worthing Gas Company.

CARBONIZING PLANTS OF THE FUTURE,

HAVING REGARD TO THE SCARCITY OF LABOUR, AND THE GAS BEST SUITED TO THE CONSUMER.

By H. D. MADDEN, of Cardiff.

[A Discussion at the Cardiff Meeting of the Wales and Monmouthshire District Institution of Gas Engineers, June 19.]

When at the request of our indefatigable Secretary, Mr. Octavius Thomas, I agreed to start a discussion on the above subject, I did not realize the task he had so to speak thrust upon me, because it is at the present time one of magnitude and vital importance to the industry. With your permission, I will reverse the two points, and deal with the latter paragraph first—viz., "gas best suited to the consumer;" for this is, after all, the chief point we must bear in mind.

As you are aware, the report of the Fuel Research Committee and the more recent report to the Institution of Gas Engineers by Sir Dugald Clerk and Profs. Smithells and Cobb, clearly indicate that the gas industry is the most essential asset for the supply of the cheapest form of heat units to the consumer, and these reports also practically embody the foundation of a new charter for the gas industry—a charter not weakened, but materially strengthened, by the fiery ordeal of the past four-and-a-half years of war experience through which we have just passed.

Unfortunately, the official mind at Westminster is covered with the glamour of super-electricity stations, which they tell us will satisfy all the country's needs in regard to heat, light, and power; and it will require all the efforts of the industry to press home the proof of the inestimable value and superiority of an efficient gas service, which is contained in the above-mentioned unbiassed reports.

It will, I think, primarily be conceded that practically 95 p.ct. of the gas sent out is utilized by the consumer in the form of heat units—for incandescent lighting, heating, cooking, and power; and therefore it follows that the gas best suited to the consumer is one having for its basis a heating standard.

I would suggest to the meeting that other factors are vital and indispensable when accepting the calorific valuation for the suitability or otherwise of a gas; for it is possible to have two gases both of equal calorific value—one, however, possessing superior qualities to the other for the purposes of domestic and industrial application. Composition enters largely into this question. The calorific powers of two gases being equal, the gas containing the largest percentage of combustible matter gives the greatest efficiencies in applied flame effect.

Much discussion has ranged round the point of one B.Th.U. being equal to another. Individually, it must be; or the true unit disappears. But, collectively, and in everyday application, it depends upon the "company" these individual units keep, or (in military terms) on the "number of efficients in their ranks."

It must not be assumed that the calorimeter will indicate flame structure or flame temperature, which are two points of extreme importance. When considering the question in all its aspects, I would also suggest the use of the gravitometer for information having bearing on the aforementioned points.

In the application of gas for lighting, factors affecting the degrees of incandescence must be studied. In gas-fires, the properties relating to the proportion of useful work accomplished by the flame temperature and structure must also be examined, and further points could be cited before the question of the gas standard of the future is approached and finally decided.

It will, I believe, be accepted in general terms that the gas most suitable to the consumer is "the supply that provides the greatest number of heat units in the most useful and efficient form per penny expended." And while developing gas manufacture on these lines, it is to the best interests of both industry and consumer that makers of apparatus and the distribution staff should wholeheartedly co-operate and examine the conditions appertaining to the application and use of the gas so as to ensure to the user the highest thermal efficiency percentage per cubic foot of gas employed by him. I believe that the future holds a great field for the development of gas supply as a domestic and industrial labour-saver, and also on the grounds of national interests in the conservation of coal. With these proved conditions before us, it behoves us as an industry to move forward and take the fullest advantage of scientific research and practical application and develop the interests of the industry to the fullest possible extent.

On the other side of the question, relating to the best methods of manufacture, if it be conceded that the consumers' interests lie in heat units, the manufacturing conditions must be on a similar plane; and the system or combination of systems appears to be the ideal one that produces the greatest number of heat units per ton of coal, on the lowest total charges.

Evolution during the past twenty years has been from uneconomical and laborious direct-fired retorts to inclines, machine-stoked horizontals, and carburetted water gas plants, to the present-day practice of vertical retorts with the steaming process. Two problems arise on this question: 1. Consideration of existing plants and their utility. 2. New or re-constructed plants.

Taking the first, and examining the question from the standpoint of existing plants where large capital expenditure has been entailed with the lay-out of horizontal settings and stoking machinery, it follows that the co-operation of the carburetted water gas plant provides a ready means and a strong case for the retention of the machinery already existing, to provide the largest number of heat units and the greatest percentage of combustible matter per ton of raw material—viz., coal and coke. The heat units per ton developed with this combination is greater than that of plain horizontal retort working alone.

In some instances, the spent charges of horizontal retorts have been steamed several hours, especially in small works; and it is quite to be understood that benefits have accrued from this process. However, in this latter case, there is the likelihood of great variation in the quality of the gas; and this must be provided for so that the outlet stream is consistent.

Coal is a complex material, and the products vary according to the carbonizing conditions. The carbonizing effects are apparent in coke, gas, tar, and ammonia, both in quantities and qualities; and it does appear drastic treatment for a heavy charge of coal to be placed in a highly heated retort. It is understood that the carbonizing conditions must vary from hour to hour as the retort is first cooled back and then gradually increased in temperature—affecting both the gaseous and the liquid products.

Economical methods of manufacture must take into consideration not only labour and the production of the highest possible quantity of useful gas per ton of coal, but must cover the constructive manufacture and conservation of the products, coke, tar, and ammonia.

Horizontal machine-stoked retorts, worked in conjunction with a carefully balanced carburetted water gas plant, give excellent economical results; but in both plants there are heat losses in manufacture—due, first, to the quenching of the hot coke, and, second, in the cycle blows of the water gas plant.

The advent of the continuous vertical retort system, and the experience gained through the war and in the matter of fuel oils, has thrown a very strong light on this system of carbonization; and progress is being made daily in the use of this already efficient system.

The continuous vertical retort system is worked-out in practice by the aid of natural laws whereby all kinds of coal gravitate by their own weight in a slightly tapered retort from the top to the bottom. Heavy and laborious labour is therefore eliminated. The speed of travel of the coal can be regulated at will and *instanter* by a simple mechanical adjustment of the coke extractor. The heats can be easily regulated from the top to the bottom of the retort, as required to suit the coal, so that there is absolute and complete control over the settings. The coal is not subjected to any drastic treatment, as, entering at the top and passing downwards through the graduated zone temperatures, both the gas and the liquid products are evolved in their true place and removed from the danger of decomposition.

A further factor is that one of the greatest heat losses found in horizontal settings is eliminated in the vertical process—viz., on account of the coal entering the top of the retort and leaving the coke chamber at the bottom as practically cold coke, while the producer step-grate, worked in conjunction with open fire doors and top control dampers, reduces to a minimum the furnace fuel costs and heavy clinkering work. In addition, the sensible heat at the bottom of the spent charge is utilized, and with the admission of steam, a continual water gas reaction is occurring—the hydrogen and carbon monoxide passing upwards—further acting as a shield and a carrier to the gases and liquid products.

Yet another factor is that the steam permeates the mass of coal, and releases more of the hydrocarbons which formerly were left in the coke; and I believe that these gases combine chemically with the gases which are being continually produced in the retort. As these chemical reactions occur and by these special means, a very much larger volume of gas of good calorific power and low inert content is secured, besides an increased quantity of tar and ammoniacal liquor.

Both coal and water gas are therefore made in the same chamber, and are intimately fixed at their point of origin—a great consideration and an entirely different matter from producing the gases separately in two operations which may be described as a "mechanical mixture," as against a "chemical mixture" in the case of the steamed verticals.

The absence of thick tar and dry dust in the ascension pipes of a vertical installation, and the almost total elimination of scurf deposits in the retort, speak plainly to the fact that the coal has been properly treated in the method of carbonization.

Bearing in mind the recommendation of the Fuel Research Committee Report to the Board of Trade—viz., that each undertaking should make the quality found to be best suited to themselves and their consumers' interests—the decision must largely be governed by the local circumstances. We in the Welsh area have our coal problem, which differs entirely from the Midland and Northern fields. Where, however, an elastic limit is recommended of qualities between 400 and 500 B.Th.U., the continuous vertical system, on account of its control and flexibility, can easily meet any and all requirements in this direction. This flexibility of working provides for any quality that is desired.

The recent published work of Mr. Hislop at Uddingston has shown the tremendous potentialities of this system. His results demonstrate that the make of gas per ton of coal (with steaming) can be carried to a figure far and away beyond anything that can be touched by a horizontal retort. His five months' test gives over 25,000 c.ft. of 460 B.Th.U. gas per ton of coal, against previous horizontal workings of under 10,000 c.ft.; while the tar and liquor figures show increases of 60 to 70 p.ct. These results are

being confirmed at other gas-works; but as yet the actual data in these cases are unpublished.

Welsh coals give very greatly increased results in verticals over horizontal working, under test conditions. While the average total calorific value of some eight Welsh coals is 5½ million B.Th.U. per ton in horizontal working, the yield increases to approximately 7 millions with vertical working, with light and easy steaming.

Summing up, the advantages conferred by continuous vertical retorts are:

1. Largely increased yield of gas and B.Th.U. per ton, and also residuals.
2. Reduction of heat losses in working.
3. Reduction of laborious work, and healthier working conditions.
4. The carrying out of all operations by slowly moving mechanism—resulting in the wear and tear being reduced to a minimum.
5. The production of a practically constant value gas (which can be varied at will) of low inert content.
6. Economy in carbonizing costs, and also in the raw material, coal, with a better offset in residuals.

With the advantages enumerated above, I venture to think that the vertical retort, possessing such a range of flexibility in make and heat units, combined with the less laborious conditions of working, and providing a regular output of gas of constant heat value, specific gravity, and physical condition, makes it the ideal system for manufacturing the gas most suitable for consumers, having regard to all conditions existing to-day, and would appear to be in line with the recommendations of the Fuel Research Committee as regards gas production and variable calorific powers.

I have given rather full attention to the vertical system, because of the great interest shown by the members of this Institution in our installation at Grangetown, which was, as you are aware, the first complete installation of all silica retorts, and which has now been in regular action for nearly five years. Upon your visit to the works you will be able to see for yourselves silica retorts which have been in continuous operation since 1914. I am satisfied that the transmission of heat through this material is very rapid and is conducive to good carbonizing. These retorts have stood the test well, and you will be able to see that the original shape has been maintained right up to date, having regard to the fact that the working temperatures in the combustion zones have been maintained at 1260° C.

DISCUSSION.

Mr. MADDEN said it should be borne in mind that these notes had been prepared by him before the meeting of the Institution of Gas Engineers. He had not since altered them, because he felt that he would rather present his views as they existed at the end of April than alter them in the light of discussion which had subsequently taken place at the meeting of the Institution of Gas Engineers. Perhaps he should apologize for having given rather full attention to the vertical retort. But many members had shown very particular interest in the Cardiff Glover-West vertical retorts. It was the first complete installation of all-silica retorts, and had been in use for about five years. The transmission of heat through the silica was very rapid, and conducive to good carbonizing. The original shape had been maintained.

The PRESIDENT (Mr. R. G. Clarry, of Swansea) said the information which Mr. Madden had given would prove particularly valuable. There were few present to whom the subject was not of great, if not vital, interest.

Mr. T. B. PEARSON (Pontypool) asked whether Mr. Madden thought the same results could be obtained from Welsh coal as those they had read about from Uddingston. They seemed to be extraordinary; and the question of the influence of coal naturally arose.

Mr. MADDEN replied that, of course, the difference between Welsh coals and Scotch shales had to be considered.

Mr. F. SHEWRING (Pontardawe) said Mr. Madden had stated that there was great variation in gas when steaming horizontal retorts in small works, and that care must be taken to ensure regular mixture. He (the speaker) agreed with the necessity for taking care that there was a regular mixture of gas on the district; but he did not agree that there was greater variation with steaming horizontal retorts than when making straight coal gas. He could understand that one might possibly have this trouble when intermittent steaming was taking place; but if the steaming was so regulated that they were steaming continually and coal gas was also being made continually, there was a tendency for the quality of the gas to be more regular than when working entirely on straight coal gas.

Mr. MADDEN remarked that what he had referred to was steaming the spent charges of horizontal retorts. Mr. Shewring meant admitting steam during the carbonizing period.

Mr. W. C. JACKSON (Neath) said it had given him great pleasure to hear from Mr. Madden of the success of the vertical retorts at Cardiff. There was just one point which he would have liked to have had brought before the meeting. Most of them had in their minds what could be done with Welsh coal in good horizontal practice. They did not want to press for the exact make per ton; but it would be of great assistance if they could get a definite percentage of the increased make of gas under modern conditions of steaming with vertical retorts. Some of them had seen the Cardiff vertical retorts working, through the courtesy of Mr. Madden, and had been much taken with the absence of dust and dirt, and the great saving of physical labour achieved by them. He had also seen some of the Scotch works with verticals carbonizing Scotch coals, where they had been getting very big makes. But it was the coal that they had to carbonize here in Wales which they were anxious to learn about. Two or three years ago, the question of adding blue water gas to coal gas came into prominence; and by this means he had been able to increase the make of gas per ton by 25 p.ct. regularly. This made a considerable saving in the tonnage of coal per annum. Quite recently he went still further; and by taking the blue gas right up to the point of issue of the gas into the foul main, he had been able to increase the mixture of blue gas to the extent of practically 40 p.ct. This meant an increase of 40 p.ct. in the output of gas to the ton, and so had resulted in further considerable saving in the amount of coal used. They had about come to the end of their installation of horizontals at Neath. The retorts were single enders, and required much hard labour to manipulate. The question of verticals was thus a very live one to them; and if they could get some idea as to the percentage increase over the ordinary horizontal production of gas per ton, with verticals, with steaming and Welsh coal, it would be of considerable advantage.

The PRESIDENT said that perhaps Mr. Canning would reply to the discussion at the last meeting upon the subject he then brought forward; and any observations he might care to make on Mr. Madden's statement would also be appreciated.

Mr. J. H. CANNING (Newport) said he did not know that there was any particular matter arising out of the discussion of the meeting which required dealing with at any length. He would, however, like to say one or two words in the first place with regard to Mr. Mogford's contribution. The papers they were discussing at the present time were all inter-connected. Mr. Mogford had dealt to some extent with the electrical problem; and Mr. Madden and himself were dealing largely with the gas counter-programme. It seemed to him that there was nothing more important at the present time than the consideration of these questions. Mr. Mogford had hinted at a vital matter. They must not look at it altogether from their own selfish point of view as an industry, but from the point of view of the national good. There was not the slightest doubt that, if the electrical proposals were carried through in the form in which they were now presented, a huge blunder, attended with very great financial loss, was going to be committed; and it would take the country a long time to recover from it. He had listened with interest to Mr. Madden's remarks about the excellent results of the splendid installation of verticals at Grangetown. Of course, at the present time this was rather a vexed question. They had advocates of vertical retorts, and they had also those who spoke very highly in favour of horizontal retorts with blue water gas. There was no doubt the future of the industry was going to rest very largely upon a correct solution of this problem. With regard to the quality of gas best suited to town supplies, he would like to say that in this matter they must in the first place beware of extremists in their own ranks, and secondly of undue official interference. There was, of course, the school who had chosen for their motto "One unit is as good as another;" and there was a great deal of truth in what they said, provided one used gas of a certain quality for some particular purpose. He had noticed that all the advocates of this school invariably showed an extreme fondness for testing their gas by boiling water over it. One could not get them away from the kettle. But gas was used for many other purposes; and they must not lose sight of the fact. Boiling water was undoubtedly a very necessary operation, and one which could be performed much better by gas than by other means. But it was not everything; and they must supply a gas which would give a fair flame-temperature. They wanted nothing excessive. They did not desire to compete with the extreme temperatures that could be secured by certain forms of electric furnace; but they must have a good flame-temperature, if they were going to retain their gas-fire and incandescent lighting business. He did not know quite how they could best make the distinction that must be drawn between calorific value and flame temperature; but it was very much akin to what prevailed in electrical engineering, and was described by amperes and volts. With regard to official interference, in speaking of this, he was particularly referring to the proposal to improve a very drastic restriction in respect of inert constituents. This was proceeding to the other extreme. It seemed that the Government Departments responsible were never happy unless they were imposing some restriction or another upon the gas industry. They had tied them down for many years to the old illuminating power test; and they had removed this only to apply a rigid calorific power test. Now the Fuel Research Board proposed very wisely to allow a certain variation; but at the same time they were proposing the limiting of what were called the inerts to a very low percentage. He did not think they should allow the term "inerts" to pass without challenge. It was, he admitted, a very convenient term, and it was to some extent a correct one; but it conveyed the wrong impression, that the whole of these inert constituents had been intentionally put into the gas with the intention of altering its quality. He would rather draw a distinction between the proportion of inerts which was inseparable from the process of gas manufacture, and the further proportion which resulted from very bad or careless working. But he certainly thought the limit proposed was too low, and that no limit at all should be imposed without fuller inquiry and research. ["Hear, hear."]

Mr. MOGFORD said there could be no question that the future of the industry depended upon how many B.Th.U. they could supply for a penny. National economy demanded that they should do this with their local coals if it could be done at a cheaper rate than by shipping coals. They had heard during the last few months a great deal about the doings of vertical retorts; and he thought the evidence was so strong that none of them could fail to accept it. Mr. Madden had drawn a picture which would induce most of them to think that vertical retorts were the real thing they had to rely upon. He (the speaker) would venture to make another suggestion. Under the Electrical Bill, there would be a harnessing of the waste heat. The Fuel Research Board told them that the cheapest method of distributing heat energy was in the gaseous form. In South Wales they had, as a metallurgical district, large coke-ovens generating gas, and using it extravagantly, or not at all. If the gas industry could not see their way to harnessing these supplies, their rivals were going to harness them. Therefore they should take the very broadest view of the position; and if it was commercially possible, the gas industry should utilize these supplies. It might be argued that at the moment the

supplies were not available. In many cases non-recovery ovens were used; but these would have to be abandoned. Then there would probably be sufficient surplus gas to supply nearly every town in South Wales. Thus, if what the Fuel Research Board said was correct—that distribution of heat in the gaseous form was the cheapest way—then they should harness this first. They would be developing the gas industry, and at the same time cutting the ground from under the feet of their rivals.

Mr. MADDEN said that he would like, in the first place, to point out that his contribution was not a paper, but the opening of a discussion. Mr. Mogford had made remarks about other means of getting supplies of gas. He quite appreciated this; and he also appreciated the use of water gas in conjunction with horizontals. They had both in use at Grangetown, and both were efficient. It was a question, as he had already remarked, of capital expenditure, and the cheapest method of providing gas. It depended upon the demand. One must take what was most suitable for one's purpose; but it was necessary to remember that millions of pounds had been spent upon consumers' appliances, and whatever gas was supplied must be of such a nature that the consumers could make the best of it. The consumers were the people whom gas men were working for and living for. They had to give the consumers a good gas which could be used with the least possible waste. Coke-ovens had been mentioned. He had, however, not been speaking locally, but looking at the country as a whole. He had lived much of his life in the South of England, where there were no coke-ovens. These people had to have gas. If they had a supply of gas at their back-door, and it was a good gas, by all means make use of it, and supply it as cheaply as possible. As to horizontals and blue water gas, they could get the same effect in their verticals. His ideal system would be verticals, if we were putting up an absolutely new plant. They had their water gas reactions and hydrogen reactions, the heat losses were reduced to a minimum, laborious work was eliminated, and he believed it would be found that wear and tear was very much less than with any other system. Experience with verticals had been limited so far; but he thought that wear and tear per ton of coal would come out very much less with them than with anything else. But he had just an ideal in his mind.

REFRACTORY MATERIALS SECTION OF THE CERAMIC SOCIETY.

The Spring Meeting of the Refractory Materials Section of the Ceramic Society was held at Middlesbrough on May 22 and 23—Sir W. J. JONES, K.B.E., presiding over a numerous assemblage of members from many parts of the kingdom.

The first communication was on the "Geology of the North-East of England," by Messrs. J. B. Atkinson, M.Sc., and J. T. Stobbs, A.Sc., F.G.S. Next came one on the "Use of Mica Schist for Lining Cupolas and Steel Converters." Such material was stated to have proved advantageous in the United States; and the author thought similar material in Scotland should be tested. This was followed by a paper by Mr. W. J. Rees, F.I.C., on the "Corrosion of Coke-Oven Walls. I.—The Salts Extracted from Coal by Washing" [see *ante*, p. 700]. Sodium sulphate and sodium chloride are commonly present, and both are injurious. Dr. Mellor mooted the possibility of water containing some special substance or substances proving more effective for washing the coal than the water employed for the purpose by Mr. Rees.

In the afternoon, Mr. G. R. L. Chance began with a paper entitled "Some Criticisms by a Fire-Brick Manufacturer," in which he asserted that many users of fire-bricks do not properly appreciate quality in them, and more particularly in connection with their suitability for special purposes. Certain instances were adduced in support of his contentions.

Dr. A. Scott then read a paper on "Factors Influencing the Properties of Silica Bricks (Part I.)," in which he recorded the effects of various bonding materials on the inversion of quartz to the low specific gravity forms of silica, and on the more important properties of silica bricks.

The next communication was by Dr. J. E. Stead, F.R.S., "On the Character of Bricks Removed from the Roofs of Open-Hearth Furnaces." The work recorded confirmed results reached independently by Mr. E. Rengade and by Mr. C. S. Graham. Another interesting paper was by Dr. W. Rosenhain and Mr. E. A. Coad-Pryor, B.A., on "A New Type of Recuperative Furnace," an important feature of which is that it can be left to itself for a considerable time—as, for instance, overnight—without serious danger of any wide variation from the condition in which the operator leaves it. Mr. H. M. Ridge mentioned that a furnace on similar lines had been used for some time.

Dr. Mellor presented the report on "The Standardization of Tests for Refractory Materials (Part III.)," which had reference only to the penetrative action of slags on fire-clay linings of furnaces and on fire-bricks. Three methods of testing were described; the arrangements being illustrated.

Mr. J. C. Thomlinson, B.Sc., communicated a paper on "The Glazing of Refractories." "Further Notes on Zinc Furnace Refractories" by Mr. J. A. Audley, supplemented the paper on the same subject read at Swansea.

Sir W. J. Jones was again elected President of the Ceramic Society. In the course of a speech, he quoted figures relating to the home production of refractories during 2½ years from July, 1916, to the end of 1918. The silica bricks manufactured during this period amounted to the equivalent of 275,295,000 of 2½ in. squares, and magnesite bricks to the equivalent of 15,089,900 2½ in. squares—in both cases for munitions purposes only. In the same time, 49,600 tons of silica sand were used for steel furnaces, and 150,222 tons of coke-oven bricks (or about 50,000,000 bricks) for coke-ovens whose output of coke was scheduled. Firms working only for munitions made 3,585,475 tons of fire-bricks (or about 1,200,000,000 bricks).

A report relating to the British Refractories Research Association was adopted. The Association may now be registered and can start working, having been brought into existence as the result of a resolution passed at the Swansea meeting last year. The membership of the Association will be made up of firms, companies, and individuals having some connection with refractory materials and products. The Association will be managed by a Council elected annually by the members on a wide basis, with Dr. J. W. Mellor as Technical Director of research work. The contribution of members is to be 5 to 50 guineas per annum for five years; and further liability is limited to £5 per member (if necessary) in case of liquidation during the period of membership, or within one year afterwards. For five years the Department of Scientific and Industrial Research will add an amount equal to that contributed by the members. Co-operation with similar research associations in other industries is contemplated, and members will enjoy certain privileges in the way of getting answers to technical questions, suggesting subjects for research, the use of resulting patents, &c. A preliminary programme of research covering a wide range has been drawn up.

Good Grade Domestic Coke.

In a paper which he read at the Iowa Gas Convention, Mr. C. J. Hauschildt enumerated what he regards as the essentials for marketing good grade coke for domestic consumers. Having chosen a suitable coal and properly carbonized it, the quenching of the coke is one of the most important things to consider. As soon as the coke is withdrawn from the retort combustion begins, and just enough water should be used to properly quench it. Coke when hot will absorb 50 p.ct. of its weight of water, if given the opportunity; and if such coke is put into a pile, it will never dry out. On the other hand, dry coke when cold will absorb practically no moisture, and when in a pile will be penetrated only a foot or so by even a hard rain. This water will remain almost entirely on the surface of the pieces, and two or three days of good sunshine will evaporate nearly all of it. A coke that has been drenched instead of quenched is not acceptable to the user, for the reason that the spongy characteristic makes it tenacious of water; and if dry coke is to be marketed, it must be made so at the time of quenching. Coke can be stored in the open or in sheds; and the less it is handled, the better. The pile should be so arranged that after the first start of it is made, the fresh coke is dumped upon the other coke and allowed to roll to the ground. In creating a demand for domestic purposes, it becomes necessary to instruct the public in the use of the coke; and coke should be advertised, as all successful commodities are. The new-business department, by the use of representatives who not only sell but demonstrate until the consumer is thoroughly versed in the use of the coke, is the most effective method of all. It has also been found very satisfactory to co-operate with local dealers for them to handle the entire output of the gas-works.

Plant Life and Gas.

Writing in "Gas Industry," of Buffalo, Mr. Lewis Knudson, the Professor of Plant Physiology, College of Agriculture, Cornell University, says it is a fact generally recognized by the public that asphyxiation of animals may result from the accumulation of illuminating gas; but it is not generally known that plants are far more sensitive to gas than is any known animal. While there has long been knowledge that the death of trees may result from leakages from gas-mains, less attention has been directed to possible injuries to house plants and danger to conservatory and greenhouse plants; and annually very considerable loss is sustained through failure to recognize the facts. Going into details, he stated that the sensitiveness of carnation buds and flowers has been well worked out. It has been found that unopened buds of carnations exposed for three days to a mixture of 1 part of water gas and 40,000 parts of air will be so injured as to become incapable of opening; while open flowers exposed for twelve hours to 1 part of gas in 100,000 parts of air will fold their petals and assume the "sleep" condition. The same response may be induced by 1 part of ethylene in 1,000,000 parts of air. Many plants lose their leaves when exposed (say) for four days to a concentration of illuminating gas varying in different cases from 1 part in 1000 parts of air to 1 part in 100 parts. Discussing the question of what constituent of the gas is probably the injurious agent, Prof. Knudson says methane, carbon monoxide, acetylene, and ethylene may all be harmful. The evidence seems to show that ethylene is the constituent of the gas which causes the damage. The very weak concentrations of gas which result in injury are incapable of being detected by odour; and consequently a greenhouse crop may be destroyed before one may even suspect gas leakage. The danger is greatest in winter time, when the surface crust of soil is broken, and escape of leaking gas is only possible where the ground is not frozen. He says it would seem advisable that gas-mains in the vicinity of greenhouses should be encased in some manner, and the encasement be provided at intervals with small outlets to the surface for the escape of gas.

"B.C.G.A." CONFERENCE AT COLWYN BAY.

A North Wales District Conference of the "B.C.G.A." was held at Colwyn Bay last Tuesday, under the chairmanship of Alderman F. S. Phillips, of Salford.

Unfortunately, no intimation was received by us that such a meeting was in contemplation, until it was too late to arrange for any representative of the "Journal" to be present to take a note of the proceedings. We are, therefore, able to do little more than indicate what was intended to be the course of business—making use of the particulars contained in the agenda issued for the meeting, supplemented by a few notes that have been forwarded by Mr. W. M. Mason, the Secretary of the Association.

There was, it is said, a good representative attendance of gas men from the North Wales district, many of whom expressed appreciation of the value and usefulness of such meetings as that at Colwyn Bay—more especially in districts far removed from the larger industrial centres.

The order of business was first of all an address of welcome by the President of the conference. His remarks appear below, practically in full.

Mr. Mason subsequently submitted figures showing building economies, similar to those referred to in the course of the proceedings at the Edinburgh Conference the previous week, as reported in last Tuesday's "Journal." He supplemented this by a statement respecting the work and policy of the Association, founded on the speech made at Edinburgh by Mr. Goodenough.

The third item on the agenda was a discussion on "Gas Service in National Housing Schemes." This was opened by Mr. J. Smith of Colwyn Bay. Extracts from his paper follow the address by Mr. Phillips. Among those who took part in the discussion were Mr. P. F. White, of Bangor, Mr. F. A. Pye, of Chester, and Mr. Owen Evans, of Wrexham.

In the course of the subsequent proceedings, Mr. Owen Evans gave some interesting figures in connection with a local garden village in his district.

After votes of thanks had been passed to those who had taken part in the proceedings, afternoon tea was served to the visitors.

ALDERMAN PHILLIPS'S OPENING REMARKS.

Alderman Phillips said: We are met to-day, in this delightful seaside resort, under the auspices, and on the invitation of, the "B.C.G.A.," as we familiarly term it; otherwise known as the British Commercial Gas Association. Many of our friends present are members—some from its inauguration seven years ago. In this short but eventful period (beginning, I am glad to say, in Manchester and Salford), it has shown itself to be a strong, active, and most useful organization; and year by year, notwithstanding the terrible period of the war, it has gone uninterruptedly from strength to strength, and now comprises fully 85 p.ct. of the gas undertakings of the British Isles, and includes among its supporters the principal gas undertakings of the kingdom. To instance one only, the Gas Light and Coke Company contributes over £3000 a year on a subscription of 2s. 6d. per million c.ft. of gas sold—equivalent to about 1d. per consumer.

It evidence of the value of the services of the "B.C.G.A." were needed, it is surely manifest that no undertaking—however large and however wealthy—would pay such a sum unless it was beyond doubt a good, sound, and desirable investment from a business point of view. That it is so is largely due to our excellent Executive Chairman, who from the beginning has infused into the movement a spirit of life, and promoted a wise and far-seeing policy, with most gratifying results. And we also owe much to our indefatigable and able Secretary, Mr. Mason, who I am glad to say is here with us to-day, and will presently address us. I (on your behalf as well as on my own) offer to him a cordial welcome, coupled with every good wish for the maintenance of his health and strength, that he may long continue the excellent work into which he has thrown a great ability and an unfailing courtesy of which it were impossible to speak too highly. But I hope I am also addressing some of the 15 p.ct. who have not yet seen their way to join us; and to them, whether directors, committee-men, or gas engineers and managers, I wish to offer a cordial and hearty welcome.

In the limited time at my disposal, I shall endeavour to adduce some convincing arguments why, in their own interests and in those of their undertakings as well as the communities they serve, it is well worth their while—indeed I might almost say necessary to themselves—that they should become contributory members, and share with us in the benefits we can render in increasing proportion to all, if fully representative of the whole industry.

Notwithstanding all the good services the gas industry has rendered throughout the length and breadth of the country in pre-war times, and the invaluable aid they have been able to give during the war in response to the appeal of the Government, there are times of difficulty present with us now, and the outlook ahead is not free from some anxiety. For instance: Legislation and Government regulations, which press hardly on us, and in which combined action is absolutely essential to success; labour troubles, which are acute, and of which the end is not yet; and the coal supply, a very serious problem. These are matters more particularly for the National Gas Council. But we have now to meet the competition of electrical undertakings; and their claim is that electricity should occupy the whole field of supplying all one wants in the way of light, heat, power, and chemical action. What in this case, if it were true, is left for gas? Evidently we are to be completely displaced, if we have nothing to say for ourselves.

If, however, we remain separated—each confined within the limits of his own area, with no collective counsel or advice from our colleagues in matters which are of supreme importance to us—upon whom is to devolve the duty of presenting our case? The gas manager is already charged with many important and multifarious duties. He has to maintain a full supply of gas, if he can secure the requisite coal; he must be continually watchful of the condition of his works and plant, his mains and services, of the quality and quantity of his make of gas, of the disposal of his coke, tar, and other residuals, of the price of his gas and other products; and he must carefully consider all the prevalent labour demands. Is he therefore (already fully occupied in circumstances calling for wide knowledge and ripe experience) to be further charged with the duty of refuting the excessive claims of electricity, backed be it remembered by Government aid? If not, where can we turn? Fortunately the "B.C.G.A." is in existence.

Again, gas which came in at the beginning of the Nineteenth Century, has not stood still. The past hundred years show a record of continual inventions and improvements. Time was when 3 candles light per cubic foot was considered good; with the incandescent mantle we can now give 20-candle power per cubic foot, and with high pressure from 40 to 60 candle power per cubic foot per hour. But the general public are even yet woefully without knowledge. Who is to educate them? Is this another of the duties of the already fully occupied gas manager? Shall he not have the aid that the "B.C.G.A." so willingly offer?

Further, gas is now used advantageously in a great variety of ways, and for a great variety of purposes—such as heating and cooking in all classes of houses, factories, business premises, hotels, and public institutions, and for trade and business purposes, such as gas-fires, motive power, furnaces for metal melting, annealing, for brazing, soldering, forging, hardening, tempering, welding, for sterilizing medical instruments, desiccating and preserving food stuffs, and for many other purposes. Who is to make these things known to those who need them? Again is this duty to be discharged by the gas manager unaided?

When some gas consumers, actual or prospective, waver, and want to know just what are the relative merits of gas and electricity for their purposes, is it again the duty of the unaided gas manager to supply the requisite information? Can he give his time to all these purposes as well as to the many important duties already depending upon him.

I know he will do all that one man can do; but here is where the "B.C.G.A." comes in. Does he want to advertise? The "B.C.G.A." offers him a wide choice of well-thought-out and attractive advertisements. Nay, it spends large sums itself beyond the capacity of any one undertaking in advertising the multifarious uses—the thousand and one uses—of gas. Last year's expenditure in advertising amounted to over £14,000. It will answer all sorts of questions. It does give all sorts of information to all sorts of people all over the country, without considering whether the particular gas undertaking from whose area the inquiry comes is or is not one of its subscribers. It engages the services of experts for its various requirements, which no one undertaking can do. Does some question requiring wide knowledge of scientific fact and experience arise? Again the "B.C.G.A." has at command the best scientific expert. The public require educating. The amount of useful printed matter supplied to various undertakings specially prepared by the "B.C.G.A." and sold at low rates produced over £2500 last year. About August last some £3000 was expended in educating the public as to the meaning of the Household Fuel and Lighting Order. It has rendered valuable services to the Board of Agriculture by instituting a campaign on the question of food preservation; and National Kitchens have had considerable help. Over half-a-million copies of leaflets and booklets on these subjects were distributed; and it has rendered great service in promoting the use of gas for traction purposes. The housing schemes have had attention; some thousands of pamphlets have been distributed to interested parties; and over two hundred schemes have been brought to the notice of the gas undertakings concerned. For the current year, coal conservation will have its turn—the text being that "Gas is the Fuel of the Future."

Correspondence with members, and answering inquiries from the general public is an extensive matter, and is growing still greater—including providing information for architects, builders, engineers, &c. Corrections of misstatements in the Press, and in technical publications is another matter receiving attention, and generally acting as watchdogs for the industry. Local difficulties are advised upon on sound lines by the Association, which in this respect is really a Bureau of Information, used even by Government Departments.

The possibilities of the future imply a need for sales organization and development on systematic lines, and is receiving careful consideration. It is hoped to engage a skilled consultant business builder, whose services can be obtained for a limited period by undertakings so desiring—payment being based upon services rendered.

Take the question of coal conservation, which is all-important to-day. Do the public know the relative merits of gas and electricity as it is essential that they should? Is it again the gas manager who must be responsible for the education of the community? We cannot stand still. For us it is either progress or

retrogression. Now we have a really good case to present which needs to be made known.

Let me take then, as one example, this question of coal conservation. The country will be compelled to make the utmost beneficial use of coal in the future. That is common knowledge. How does gas stand in this respect as compared with electricity, which we are told is to supply all our future wants? Out of every 100 heat units contained in the coal, 7·6 only are conveyed to the consumer by electricity, as against 45 by gas. Or, taking the best existing station in each case, 11·7 heat-units will reach the electricity consumer, as against 53 for gas. The anticipated figures, which it is hoped will be realized in the proposed super-stations, are 18 for electricity compared with about 75 anticipated for gas. Our electric friends propose under the new scheme to begin recovering the bye-products, all of which are at present wasted. But we (gas undertakings) are doing this now, and have long done so. There is the coke—a smokeless fuel. There is the ammonia, of which as sulphate of ammonia thousands of tons have been used as fertilizers for food production during the war. There is the tar, from which are obtained carbolic acid and other antiseptics, benzol and toluol—no longer needed to destroy human lives, but henceforth finding employment in the production of valuable dye-stuffs, creosote, aniline, naphthalene, anthracene, and an endless variety of other derivatives which I need not weary you by naming here. All these are at present wasted in electricity works.

One point further may be made on this question of coal conservation. It was estimated that there were 35,000,000 tons of coal used in 1913 for domestic purposes. Now an old-fashioned grate is reckoned to yield only 8 p.ct. of useful heat service, while the best does not exceed 25 p.ct. Assuming the whole of this coal service at 25 p.ct., it would represent 8,750,000 tons of coal. Reckoning the electric heater as giving a uniform efficiency of 100 p.ct. the generation of the electric current necessary to enable the consumer to enjoy this amount of heat would require some 54,700,000 tons of coal, with the residual products all lost according to current practice.

Let me repeat that what the "B.C.G.A." is doing no one of us can do alone; and I will, therefore, conclude these remarks by cordially inviting every non-subscribing undertaking to reconsider the matter in its own interests. in the hope that we may soon be able to say that this valuable Association is completely representative of every gas undertaking in the country. When once the spirit of unity prevails, I am confident that gas can and will render to the nation larger services, which will become increasingly valuable and widespread as time goes on. It will largely contribute to bring about cleaner towns, and a healthier people whose lives shall be made pleasanter by the freedom from smoke and fog and grime which are now so great a reproach to our civilization.

JAMES SMITH'S PAPER ON "GAS SERVICE IN NATIONAL HOUSING SCHEMES."

Among the many reforms occupying the attention of local authorities, probably none is of such pressing importance as the provision of improved and adequate housing for the artizan classes. With the end of the war, many schemes of projected housing reforms (long delayed) are being matured as promptly as national resources will allow. Local authorities are, without stint, giving a great amount of attention and consideration with a view to arriving at the most economical and efficient methods of solving the problem.

The Government are also impressing on local authorities the necessity of proceeding as promptly as possible; and probably the next twelve months will see developments of many of the projected schemes. Consideration is also given to a conservation of our national fuel supplies, with a view of obtaining the fullest value from the constituent parts. The modern home, to meet the needs of the times, must be equipped with a maximum of efficiency for a minimum of labour; and as gas heating, cooking, and lighting have hitherto played such a prominent part in the economic efficiency of household management, it was suggested that a profitable hour might be spent in discussing the developments of housing schemes from the gas standpoint.

The national importance and the magnitude of the gas business for domestic and trade purposes may be culled from the presidential address at the annual meeting of the Institution of Gas Engineers held last month.

[The author then gave some extracts from the early portion of the address referred to (see *ante*, p. 479), and followed these by reproducing the conclusions set forth in the recently issued report on the "Coal Gas and Electric Supply Industries of the United Kingdom" by Sir Dugald Clerk and Professors Smithells and Cobb—see "JOURNAL" for April 29, p. 235.]

These conclusions [the author resumed] conclusively prove that, from the point of conservation of our national resources and economy, gas will undoubtedly maintain its own, and should eventually be the medium for the passing of fuel on to the consumer in the best and most easily convertible form. There are, however, other points which necessarily require consideration—viz., efficiency and hygienic aspect.

From the standpoint of housing reform, it may be best to treat these aspects under various headings; and to this end the subject of gas for domestic services might be classed under the following sections: (1) Cooking, (2) heating, (3) hot water supply, (4) lighting.

1.—COOKING.

This is probably at the present time the largest field for the domestic use of gas; and houses without some form of gas cooking utensil are probably in a minority. The utility and labour-saving advantages are undoubtedly the foremost of its qualifications—the fact that at a moment's notice a full supply is available, at any hour of the day or night, for cooking, boiling, or heating water. During the hot months of summer the housewife is able to work under conditions which are much superior to, and less fatiguing than, when a coal-heated arrangement is installed. The working is exceedingly elastic, cleanly, and economical to those having to rise early or be out late; and to either of these the comfort from the use of gas apparatus is most appreciated. The absence of dust from the use of this fuel makes the housewives' duties materially lighter. The various models set forth by representative gas-cooker makers give a wide variety of choice in design and application. The potentiality of gas and electricity leaves no doubt as to which is the economic agent, which must have the foremost place in the average house, and the test of time has fully proved the efficiency and utility.

2.—HEATING.

The open fireplace consuming coal has always been a representation of one of our great English characteristics. Never mind its wastefulness and its polluting effects on the air, it is a good companion. It heats a room in the right way—that is, by radiant heat and not by convection—and enormous volumes of air drawn up the chimney by the draught make it a valuable engine of ventilation. One of the great prejudices which has always existed among sanitarians against the gas-fire has been the supposition that its installation would do away with the ventilating effect of the open fire, and so render the air more unhealthy, and, further, that the cost of the gas-fire was considerably greater than that of coal.

Cost Comparison.—The last objection, which certainly is one of the most serious in hindering the adoption of gas-fires, is based largely upon fallacious methods of estimating the comparative costs of the two, as when reckoned (as is usually done) by the cost and number of B.Th.U. present in a pound of coal and in a cubic foot of gas, the gas would cost, roughly, about five times as much as the coal for the same number of units. When, however, we take into consideration the efficiency of the grate, we find that the difference practically disappears. With a modern gas-stove we can obtain not only the warming of our rooms under conditions every whit as hygienic as with a coal-fire, but at a cost which is practically the same. When coal is burnt in an open grate, only one-fifth of the heat units present in it are conveyed to the air of the room; while with the modern gas-stove nearly four times as great an efficiency can be obtained. The balance in cost is amply made up by the cleanliness in use, by the absence of dust and labour entailed in the supply of fuel to the coal-fire, and by the economy of lighting the fire only when it is wanted and turning it out when done with—to say nothing of the fact that it goes out only when the tap is turned off, and that the noise and effort of stoking are dispensed with.

Hygienic Claims of the Gas-Fire.—In considering the hygienic claims of the gas-stove, we must take into account, first, the way in which the heat passes from the stove to the room and its occupants. With the coal-fire, this is done almost entirely by radiant heat, which does not directly raise the temperature of the air, but radiates heat to the floor, the walls, and the furniture, which absorb it, and again slowly part with a portion of their heat to the air in contact with them; so that the walls and other solid bodies in the room are at a higher temperature than the air. There is no doubt as to this being the true method of heating. It is the way that Nature heats the world. The sun's rays beating down through the atmosphere leave it fresh and unwarmed; but as they reach solid matter, they rapidly raise its temperature, and the solids, in turn, by convection, gradually warm the air.

Apart from its being much more healthy to breathe cool than hot air, there is another very important point to consider. The normal temperature of the body is 98° Fahr.—this temperature being maintained by the slow combustion processes going on in the body. By the laws of radiation, a heated surface parts with its heat more or less rapidly, according to the temperature of the surrounding bodies. So that if a person is sitting in a room filled with warm air, but near to a wall colder than the air, his body will rapidly part with heat by radiation to the wall, and a sensation of chill is the result. With the open fire, this is never the case, as the radiant heat from the fire heats the walls of the room to a temperature higher than that of the air.

When, however, a room is heated by hot-water pipes, steam, or any of the central methods of heating now so popular, the temperature is raised by convection—that is, the air in contact with the heating surface is raised in temperature, expands, and sets up convection currents. This takes place until the whole of the air in the building is raised to a given temperature. Heating of this kind, however, always suffers from the drawback that the air is hotter than the walls and other solid bodies; so that although a room may feel oppressively hot, a chill may easily result from the body radiating heat to the walls.

Superiority of Gas-Fires over Coal-Fires.—In the best forms of gas-fire, the burning gas heats radiating material in such a way

that a very large percentage of the heat of the gas is converted into radiant heat, and passes into the room in the same way that the heat from the clear coal-fire does; while the convection heat, which used to be the chief source of the heat of a gas-fire, has been reduced to a minimum. The efficiency of the stoves has been so increased that more than 60 p.ct. of the total heat in the gas is utilized. So that, in heating effect, the gas-stove is far superior to the coal-fire.

The mistake was made in the early days of the gas-stove of completely filling up the space between the exit flue and the fireplace, so that all the air from the room had to be drawn through the radiant mass in the grate. This leads not only to diminished temperature, but also to a decrease in the amount of air withdrawn from the room. If, however, the flue of the gas-stove is carried some little distance up the chimney, and a space is left round it, this will act as the injector of the bunsen burner and withdraw from the room nearly as large a volume of air as the open fire does; while the cooling effect of the gases and air upon the radiant material is avoided.

Obsolete Types of Gas-Fires.—With the old forms of gas-fire (in which the mistake was made of trying to utilize most of the heat value of the gas by causing it to heat air, which, by convection, raised the temperature of the air and not of the solids in the room), the percentage of humidity was so decreased that it caused rapid evaporation from plants and the occupants of the room—producing drooping in the former and discomfort, dry lips, and smarting eyes in the latter. The cry that gas heating "dried the air" was raised against its use; while bowls and saucers were placed in front of the stoves to add water vapour to the air, and so decrease the discomfort. The cause of this trouble disappeared when once it was recognized that radiant heat was the only true and hygienic method of heating; and in the modern gas-stove the amount of radiant heat has been increased to the maximum attainable, and convection plays a very small part.

Where Convected Heat may be Used.—While, with justice, we condemn utterly all systems of heating which raise the temperature of the air by convection alone, we must not lose sight of the fact that when rooms or halls of large cubical content have to be warmed, convection, which as a chief or primary source of heating should never be used, may yet play a very useful *rôle* as a secondary adjunct to radiant heat. Where convected heat is used as a sole method of heating, the air has to be raised to a high temperature to ensure its carrying the heat over a large area. This excessive heating makes it so hungry for moisture that the discomforts incidental to the old gas-stove are reproduced, and we have conditions of the most unhygienic character. For raising the temperature of the air of a large space two or three degrees, to aid and hasten the effect of radiant heat, what I may call "low temperature convection" is often of the greatest value.

Take, for example, a large schoolroom on a cold winter's day. No single gas or coal fire could supply the radiant heat to warm the whole room to the right degree before it was occupied in the morning; but if radiators—so-called because they give nothing but convected heat—are fixed in two or more places below the windows, they will give the air the two or three degrees necessary to enable the radiant heat of the gas-fire to quickly complete its work of raising the temperature of the solids in the room, and yet will in no way detract from the hygienic conditions. For such a purpose gas-heated steam or hot-water radiators answer perfectly well.

In a climate such as ours, in which we often run the gauntlet of the four seasons in twenty-four hours, the ease and quickness with which a gas-heating system of the right type can be brought into play is no small asset in its favour; and although in the abstract we may be willing to accept Dr. Leonard Hill's dictum that cold and hunger are thoroughly hygienic, we also feel that, unless specially trained to enjoy them, a middle course is the best for us individually.

3.—Hot Water Supply.

Probably one of the most efficient application of gas during the past ten years has been the bulk heating of water for household use. Formerly the geyser was a popular method for the use of gas for water heating; but the modern gas circulating boiler with thermostatic control of the heat and gas consumption has entirely revolutionized the ideals and usage of gas for water heating. The installation of such apparatus, whether the system is to work in conjunction with ordinary household back-boilers or separately, is undoubtedly a most popular and useful adjunct to the working of an ordinary household. The running cost, more especially with the combination just named, shows marked economy in the household fuel bill, allowing the coal range to give its quota of heating water when it is necessary to have a coal-fire in the grate. Quite a number of installations have been fixed in this town, abolishing the use of the coal-grate in the kitchen; and the efficiency and economy of such installations have given every satisfaction from both an economic and efficiency standpoint.

Boiler on Usual Circulating System, with Storage Cylinder.

(1) *Cost of Installation.*—The gas supply would be best taken direct from the meter, although not absolutely necessary where pipes of a good size have been run to the scullery—say, 30 ft. of ⅞ in. The circulating pipes from the boiler would be carried direct to the cylinder, which it has been assumed would be in a room immediately above the boiler (or, preferably, in the same room). Flue piping, taps, sundry fittings, &c., will be needed. As an approximate figure, it may be taken that the cost of the boiler, *plus* its installation materials and labour, including a margin for overhead expense, would be £10 15s. This would include a stand on which to place the boiler, but does not include the cylinder—this being, in the event, assumed to be included by the builder with a circulating system from the coal-grate.

(2) *Running Cost.*—It will be anticipated that this system will show a somewhat higher cost of consumption than direct heating, chiefly owing to loss of heat by radiation from the cylinder and pipes. These losses can be materially reduced and the efficiency heightened by lagging the cylinder with insulating material, and by the boiler and cylinder being in the scullery (and therefore near the sink tap) and immediately underneath the bathroom. If the pipes to draw-off points could not exceed about 6 ft. to the bath and handbasin, and 6 ft. to the scullery sink, it would be a distinct advantage; but whether architects can be persuaded to provide this convenience must be a matter for local attention. If the cylinder is combined with the boiler on one stand, it naturally shows a much higher efficiency than fixing the boiler on the ground floor and the storage cylinder on the first floor.

Now in actual practice, where a coal-fire was present, it would naturally, during the cold weather, be used for providing hot water, and the gas-boiler would be cut-off. To this extent, therefore, the gas consumption would be reduced. It must also be remembered that as this would occur most often in the winter months, when the general warmth of the fire would be appreciated in the room, and when the temperature of the cold water was at its lowest, a considerable saving in gas can be reasonably anticipated.

(3) *Convenience in Use.*—This method in practice is, of course, similar to that with which everyone is now perfectly familiar—viz., the circulating system with the boiler fitted behind the kitchen range—except that there is no uncertainty as to whether or not the fire will light or whether it will draw properly. Hot water is not available immediately one arises in the morning—sufficient time must be allowed to heat-up the water, or part of it, in the cylinder. It is easy, however, to calculate the time this will occupy, and arrange baths and other requirements accordingly. Once the cylinder is full of hot water, then, with ordinary requirements, scalding water will always be available by waiting. When the water is only wanted for scullery purposes, &c., this period of waiting will be reduced to an almost negligible time by the "cut-out" valve, which virtually reduces the capacity of the cylinder to 5 or 3 gallons. The gas-boiler heats this quantity in a few minutes; and so long as baths are not required, it will be ample for all general household purposes. When a larger supply of hot water is wanted, the valve is open to bring the whole contents of the cylinder into circulation. The automatic thermostat ensures economy of gas consumption. Therefore the gas needs no attention—regulating itself to the demand for hot water.

(4) *Lifetime and Maintenance.*—The boiler is constructed entirely of cast iron. It is, therefore, practically indestructible and everlasting. There is nothing to get out of order, and nothing likely to require replacement. It is ideal from the view point of the maintenance department. This apparatus is only one portion of the field operated—another being the washing boiler or copper, which in many houses is utilized for heating water for the bath, &c. The economy of installation and the running expenses are too well known to require further reference.

4.—Gas Lighting.

The present method of lighting by gas is almost solely by incandescent burners of the upright or inverted type, particularly the latter. The efficiency of low-pressure inverted mantles over the open flame is on the average as 10 to 1, and this gives it a premier position as regards cost. The other considerations are not purely economic. It might be necessary to consider gas a lighting medium, especially for household use, under hygienic and decorative aspects. These have been fully discussed from time to time in various papers submitted to the professional societies. It is generally admitted that, on the question of installation costs, the relative advantages of gas and electric light are practically equal. Running costs give a large margin in favour of gas for equal values of light. Economy, however, can be made in electric running cost by the installation of small units placed closer to the work.

The principal arguments raised by opponents of gas lighting are on hygienic grounds. This has been a subject of considerable controversy, which, however, is held by the highest authority to be without foundation. In modern systems of purification, the products of combustion are carbon dioxide and water. On the other hand, organic matter in gas-lighted rooms is considerably reduced by the diffusion and destruction by the gas-flame. The value of diffusion is such that the percentage of carbon dioxide is less at the lower part of a room—*i.e.*, about the altitude where people sit—than in any room which lacks its circulating and ventilating effect. The ventilation effect of gas is most marked from the experiments of Dr. Rideal. Another vital point in favour of gas as a light agent is the action of the electric light on the eyesight. The rays from the electric bulb are almost solely of the ultra-violet type, and as such cause severe constriction of the retina of the eye, due to the high degree of illumination per unit of area utilized; while with an incandescent mantle the degree of illumination is of a lower value per unit of filament used for the emission of light. This, however, is subject to further considera-

tion—viz., decorative deterioration. In this, electricity has a prior claim as a lighting agent, and will undoubtedly hold its own when economy of running is not the prime factor.

For domestic use, gas has so many unassailable advantages which give it a predominant position over other fuels that the wider issues involved have hitherto hardly received the emphasis they deserve. The housing campaign will bring us into contact with a large and influential section of the community—the leaders of our civic life, the most important men in our cities, towns, and villages, the aldermen, councillors, architects, surveyors, medical officers, builders, &c.; and this opening should be seized to accomplish educational and propaganda work of the very first value. The gas industry rests not only on the convenience and economy it provides in the home, but on the economic gain it brings to the nation; and with all kinds of projects of reconstruction now under consideration, it is highly desirable that the knowledge of the services of the commodity that we offer should be as widespread as possible. There is every indication that gas will be used to a very considerable extent in the new housing schemes; but there are many directions in which there is scope for developments, particularly in heating and water supply. The argument of the economic gain to the nation can usefully be employed to support the argument of the advantages in the home.

The British Association Fuel Economy Committee in 1916 estimated that 36 million tons of coal were burnt annually in the United Kingdom for domestic purposes; and to the extent that an unnecessary quantity of fuel is used to obtain the desired heat, there is national waste. Supposing these 36 million tons of coal were carbonized in the gas-works of the country, we should have (at an average of 12,500 c.ft. per ton) 450,000 million c.ft. of gas. We should also have nearly 20 million tons of coke. Then we should produce some 10 to 11 gallons of tar per ton of coal carbonized, and realize in this way about 400 million gallons of tar. In addition to this, there would be produced (say) 28 lbs. of sulphate of ammonia per ton of coal carbonized, or a total of 450,000 tons of this valuable fertilizer. The calculations, as will be apparent, are based on the result that would be obtained from an equal weight of gas-making coal; and it is not suggested that the whole of the classes of coal used in our houses would give equal returns. Nor should it be understood that it is supposed that the whole of the coal consumed for domestic purposes (extravagant as nearly all such consumption undoubtedly is) could be displaced. But a large part of it undoubtedly could be put to better use. The figure arouses one's thoughts, and demonstrates the amount of waste that is incurred by so large a use of raw coal. The householders of the United Kingdom consume, in the aggregate, more coal than the iron and steel industries, nearly as much as mines and gas-works together, and three times as much as railways.

In our data we have not taken into account the distillation of the tar, which provides oils, aniline dyes, manifold chemical products, benzene, toluol, &c. To destroy these valuable and rich commodities by the crude use of coal is emphatically a national loss—a loss that is accentuated when we consider the unnecessary employment of the labour and horse and other vehicles engaged in the distribution of coal, which contributes its quota to the wear and tear of roads. These facts, if presented in an appropriate manner, should readily gain adherents to the cause of the scientific and economic use of our remaining stock of unmined coal. We have an unrivalled claim to make; we are engaged in one of the greatest industries of the day, and one that has been of the highest service to the public.

An attempt might be made to estimate the total saving in this direction that can be achieved by the wider use of gas in the National Housing Scheme. The figure of 300,000 has been given as the number of the new houses that are urgently wanted. Incidentally, it may be noted that this huge number will only make up for the diminished building during the war, and bring us back to the average rate of building for the ten years previous to the war. Now it has been computed that the average consumption of a working-class household in the summer, when the coal range is only used for cooking and heating water, is 1 cwt. of coal per week. Taking fifteen weeks as representing the warm period of the year, and 300,000 houses, the coal consumption represents 225,000 tons burnt crudely, with their products wasting their foulness on the city air, all of which could be displaced by gas used for cooking and water heating, and an important contribution would be made towards the solving of the smoke abatement difficulty.

In these ways and others the case for gas can be presented, and advantage taken of this unique opportunity to establish the industry more firmly on the sound basis upon which it rests.

OWEN EVANS ON HOUSING SCHEMES.

Mr. OWEN EVANS (Wrexham), in the course of the proceedings, said: On behalf of the North Wales Association, I desire to express our gratitude to Alderman Phillips and Mr. Mason for their presence and interesting addresses at our conference to-day. North Wales is only a small corner of the country, and all the gas undertakings in the area are small. Nevertheless, we take a keen interest in the doings of the "B.C.G.A.," and appreciate the excellent work that is being done on behalf of the gas industry. We are also grateful to Mr. Smith for the interesting paper that he has provided.

The conference has been held at a timely moment, having regard to the important housing schemes which are under consideration all over the country, and also to the critical period which faces the industry with which we are connected. Electrical competition will be more keen than ever; and the way the Press has "boosted" the super-station schemes of the Government has prejudiced the public mind greatly to the advantage of our competitors; and in many directions we find gas is looked upon as a "back-number." We, however, need have no fear as to the future—knowing well the capabilities of our product, and as far as heating, cooking, &c., are concerned, we have every confidence that our position is impregnable. We must therefore wake up, and bring our position more forcibly to the notice of the public—especially to those who are responsible for the housing schemes in various localities. And in this direction, the "B.C.G.A." can be of incalculable assistance to us.

In my own district, it is proposed to erect some two or three thousand houses; and as far as lighting is concerned, there is every indication that this will be done electrically—in a fair proportion of the houses at any rate. But I am confident that we shall be able to secure a profitable cooking and heating business, even in houses fitted up for electric lighting. Now the question arises as to the extent of the business we may expect in houses not fitted for gas-lighting. I am fortunate in having had experience in this direction, which will no doubt be of interest to you.

A few years ago a garden village scheme was commenced just outside the town; and over two hundred houses were erected, nearly all workmen's cottages. It was decided to use electricity for lighting; and at the outset it was proposed not to use any gas at all. I had a severe struggle with the promoters over the cooking question, but eventually succeeded in persuading them that the installation of gas for cooking purposes was essential to the success of their scheme, with the result that a gas-cooker was fixed in each house, and in addition about 20 p.ct. of the houses were fitted with gas-heated coppers.

When the time came to fix the cookers and meters, we were unable to proceed with the work as speedily as we should have liked, as we were very shorthanded owing to a large number of our men having joined the army. But the delay thus occasioned, soon (and admirably) proved to the garden village authorities the immense popularity of gas-cookers. Very frequently, the secretary of the estate had occasion to ring me up and press for cookers to be fixed at various houses, as the tenants were threatening to leave, or refuse to take possession, until they had been fixed. This has been an object lesson that will be of particular service when further building is being proceeded with.

Now as regards gas consumed, a comparison of our average slot-meter consumptions will indicate fairly clearly the value of the cooking business. The average consumption through slot-meters in houses where gas is used for lighting and cooking was 13,756 c.ft. per consumer in 1917, and 14,103 c.ft. in 1918. At the garden village referred to (where electricity is used for lighting and gas for cooking), the average gas consumption in 1917 was 10,008 c.ft., and in 1918 10,800 c.ft. The consumption has been more than I anticipated; and there is the advantage that now gas is installed in the houses there is every probability of our being able to place a number of gas-fires. In fact, many of the houses have had pipes laid to the front rooms with this object in view; but, owing to war conditions, we have not been in a position to do anything towards developing the use of gas-fires.

In conclusion, I must acknowledge the inspiration and assistance that we have had from time to time from the "B.C.G.A.;" and I shall probably be troubling Mr. Mason again before long. This is one of the advantages of being a subscriber to the Association. One feels he has a right to command the services of this splendid organization. I can, therefore, confidently recommend any non-subscribers present to join the Association; and I may assure them they will receive full value for their money.

Benzene in Crude Benzols.

Mr. William J. Jones, of the Chemical Department of the Manchester University, in a communication to the Journal of the Society of Chemical Industry, describes the application of a method (to which he drew attention two years ago) whereby the content of benzene in commercial "pure" benzols could be rapidly and accurately arrived at, to the determination of the benzene content in the crude benzols of commerce. He points out that, in view of the increasing use of these products as motor fuel, this question has latterly assumed considerable importance. For this purpose, the value of the benzol depends largely on its content of benzene. The less volatile constituents (toluene and the xylenes) are of less value; while the constituents containing sulphur—carbon bisulphide and thiophen—are objectionable. The principle of the present method consists in elevating the freezing-point of the crude benzol, by admixture with a suitable quantity of a fairly pure benzol, to the region (0° C. and upwards) where the freezing-point is proportional to the content of benzene. From the weights of crude benzol and of purified benzene used in the preparation of a mixture freezing in this region, and from the carefully-determined freezing-points of the purified benzene and of the mixture, the content of benzene in the crude benzol can be calculated. Such a determination can be completed in an hour. The apparatus required and the method of procedure are explained; and details of trial determinations with several mixtures are given. It is stated that by no method of determination of benzene in crude benzols hitherto described can an accuracy or a rapidity comparable with that of the present method be obtained.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The "Control Price" of, and the Export of Surplus, Sulphate of Ammonia.

SIR,—In your issue of the 17th inst., Dr. Carpenter says: "Surely the Sulphate of Ammonia Association might have done more for the gas industry" in the matter of sulphate of ammonia arrangements.

The answer is that the issues were clearly put before makers at two public meetings, to which all makers of sulphate of ammonia were invited, and at which the policy of the Equalization Committee was decisively approved. Needless to say, we should not have proceeded with the scheme if these meetings had not demonstrated that an overwhelming majority of the makers, including those in the gas industry, supported us.

D. MILNE WATSON,
Chairman { Equalization Committee. / Sulphate of Ammonia Association.

84, *Horseferry Road, S.W., June* 20, 1919.

Reduced Working Hours and Increased Wages.

SIR,—I wonder if there are many companies in the same position as ourselves who, in consequence of the recent decision on the wages question of the Industrial Council for the Gas Industry, feel they have been very much "sold." Between two stools we have fallen to the ground.

Our company was asked a little time ago to agree to pay its labourers the same rate per hour as the bricklayers and general labourers of the district were receiving, which employment (less regular than our own) was being paid 1½d. per hour more. This request was made by the local Trades and Labour Council, and was assented to by us. We no sooner make this advance than, under the Industrial Council's agreement, we are asked to reduce the number of our working hours from 56½ to 47, but to continue to pay the same amount of weekly wage for the 47 hours as we had just agreed to pay for the 56½ hours—in other words, to sacrifice one-sixth of the time.

The whole of this loss must come out of the shareholders' pockets, because we are now charging for gas the standard rate, and can only further increase the price by a reduction of dividend. On the price at which our last issue of stock was sold, the buyers are only receiving 3¾ p.ct.—surely little enough in these days.

I am wondering whether the gentleman who was supposed to specially represent small provincial concerns like ours on the Industrial Council was as wide awake as the Union representatives, when this condition of much shorter hours without any reduction in pay was put forward.

CHAIRMAN.

June 20, 1919.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for June 18.]

Nos. 14,562—15,051.

ADAMS, A. H. & M. J.—"Manufacture and use of specific refractory material in coke-ovens for resisting action of volatile alkalies." Nos. 14,710, 14,711.

BLAIR, CAMPBELL, AND M'LEAN.—"Preparing oxidizing gases for removing carbon and sulphur deposits in hydrogen gas manufacture." No. 14,713.

CORRIGALL, W. E.—"Gas-stoves, &c." No. 14,936.

DOCKING, A.—"Valves for controlling gaseous fuel and air supply to internal-combustion engines and turbines." No. 14,810.

FERGUSON, J. L.—See Blair. No. 14,713.

GRIGGS, A. R.—"Apparatus for production of hydrogen." No. 14,942.

HART, J. T.—"Prepayment mechanism for gas, &c., meters." No. 14,859.

KEITH, G. & J.—"Pilot-light fittings for gas-lighting installations." No. 14,604.

M'LUSKY, W. B.—"Adaptor for incandescent gas-burners." No. 14,972.

MILNE & SON, J.—"Diaphragm gas-governors." No. 14,724.

SHARP AND PRESTON.—See Docking. No. 14,810.

SMITH, D. J.—"Producer-gas plants, and internal-combustion engines supplied therefrom." No. 15,035.

STANIFORTH, H.—See Milne. No. 14,724.

The Peerless Gas-Mantle Company—A Receiver Appointed.

In the Chancery Division of the High Court of Justice last Wednesday Mr. Justice P. O. Lawrence appointed a Receiver and Manager of the Peerless Gas-Mantle Company, Ltd., in the action of Wright against the Company. Mr. Simmons said this was a Debenture-holder's action; the plaintiff holding the single debenture. In default of interest, the plaintiff had called in the capital moneys, which had not been paid; and the Company were not in a position to pay. The Company appeared by Counsel and consented. His Lordship appointed a Receiver and Manager.

The Dewsbury Gas Committee have advanced the price for gas 4d. per 1000 c.ft. for all purposes, except in the case of the supply to Ravensthorpe and Soothill Upper.

MISCELLANEOUS NEWS.

PLYMOUTH GAS COMPANY.

Annual Meeting.

The Annual Meeting of the Plymouth and Stonehouse Gas Light and Coke Company was held on Thursday last, at the works—Mr. J. H. ELLIS (the Chairman) presiding.

The report of the Directors stated that the balance standing to the credit of the profit and loss account amounted to £25,843, out of which they recommended the payment of a dividend for the half year at the rate of £4 10s. p.ct. per annum on the ordinary stock, 6s. 6d. per share on the additional shares, and 6s. per share under the New Shares Act, 1879, less income-tax. This would absorb £7408; leaving £18,435 to be carried to the credit of the next account. The Directors, after careful consideration, felt themselves justified in announcing a reduction of 3d. per 1000 c.ft. in the price of gas, as from Michaelmas last. The sale of gas for the year showed a decrease of nearly 2 p.ct. compared with the previous year, due almost entirely to the Gas Rationing Orders. In August last, a Bill promoted by the Board of Trade was passed, whereby gas companies might charge such price for gas as might be sufficient to enable them to pay dividends at the rate of three-fourths of their pre-war dividends, or three-fourths of their standard dividends, whichever was the smaller. The Act did not meet the justice of the case; and the Government had neither recognized nor requited the unremitting and successful efforts of the Company, and the gas industry generally, in providing high explosives and other essential munitions of war.

THE CHAIRMAN'S SPEECH.

The CHAIRMAN remarked that last year he had to submit for the shareholders' approval the report of the excellent work of his predecessor; and this was the first year's working for which he personally shared responsibility. He thanked those of the Company's staff who had been serving the country in the war. They had kept their places open for them, and welcomed them back. He also wished to acknowledge the generous support his colleagues on the Board had given him. The accounts of the past year contained many satisfactory and some unsatisfactory features. The capital account had not been added to, and stood at the low figure of £417,473, which worked out at £317 per 1,000,000 c.ft. of gas sold. The revenue account showed a total expenditure of £236,444, an increase of £16,697 on last year. The excess was due mainly to two items of manufacture, coal and oil, which accounted for an increase of £4017, and one item under distribution—repairing, renewing, and refixing meters—an increase of £2879. The outstanding fact to be taken into account was that there was a total increase on wages and oil of no less than £24,500. The superannuation fund which had been established involved a charge of £291 for this year. Rates and taxes accounted for an increase of £1100. The undertaking suffered from an excessive assessment; and he hoped they would be able in the current year to effect, by friendly arrangement, a settlement which would be just to the Company and to the other ratepayers of the town. With the exception of a reasonable reduction of this rating item and some saving on the active service pay of the men who were with the forces, which would gradually cease as they returned, he did not see where they were to cut down expenses unless it was in the cost of oil and of freight. In oil they were already assured of considerable saving. Last year they were obliged to pay no less than 1s. 4d. per gallon. It was less than half that price now. The saving this year would be £8000 at least; and if they obtained sympathetic treatment from the Government, it would be more. The Government had 26,000 tons of oil in stock, bought for war purposes; and they controlled the price at 8½d. per gallon, although the same class of oil could now be purchased in the open market for considerably less. In this way a tax was placed upon the commercial community; but it was nothing like so bad a tax as was placed upon them in the matter of freights. If he was rightly informed, the Government made a profit of at least 10s. per ton on every ton of seaborne coal brought from the Tyne to Plymouth. This was a very serious thing indeed for the Company, who carbonized some 70,000 tons of coal a year.

THE REVENUE ACCOUNT.

On the income side of the account, there was a decrease in the sale of gas of £3266, due to the Rationing Order and to the reduction in the price of gas made in the latter part of the year. Residuals showed an increase of £5704, due mainly to increased sales and higher price of coke, and also to the increased price of tar and its derivatives. With regard to tar, the system of combined working between the producers and distillers, of which Plymouth was the pioneer, was extending to the great advantage of both producers and distillers. Devon and Cornwall were now united with Somerset, Dorset, Hampshire, and parts of Sussex and Berkshire, and there was a suggestion that the scheme, with some modifications, should be applied nationally. This system of dealing with one of their products had its origin with their Company and with Mr. Kilpatrick. He believed it was destined to be of the greatest benefit to the gas industry. The importance of residuals to the Company was shown by the fact that they realized from them £51,404, as against £129,988 paid for coal; while to the country they were of inestimable advantage both in war and peace. During the year complaints as to the want of pressure of gas had been remedied in one of the districts of supply—a new main having been laid at a cost of £2000. Steps were being taken to deal in the same way with another district, and the work would be done before next winter. They had also pushed on vigorously with the renewal of the carbonizing plant and other work. They had renewed, or were renewing, ten settings of retorts, installing improved water-gas generating plant, and were extending the electricity plant. During the year the price of gas had been reduced by 3d. per 1000 c.ft., which meant that the consumers of the town, who were in effect the ratepayers, were relieved of a charge of no less than £15,000.

EFFECT OF THE WAR UPON THE COMPANY.

In this connection it was interesting to note the effects of the war

upon the undertaking. In the year preceding the war, the wages bill at the works came to £23,000; last year it was £53,000, and in the present year it would be £67,000. As to the consumers, it was a moderate estimate to say that they suffered by the war a loss of £200,000, and the shareholders' loss in decreased dividends was no less than £157,000; so that, whatever might be said as to profiteering, it was a charge which could not lie against the consumers nor against the shareholders. Another interesting point to notice was that, while oil and coal had gone up enormously in price, residuals had not advanced to anything like the same extent.

THE OUTLOOK—ELECTRICITY SCHEMES.

As to the future, were the industry free from the trammels of obsolete legislation and the harassing restrictions of Government control, and could they see what were the prospects with regard to the supply and prices of coal and other material, he should consider the outlook as brighter than at any previous time. One of the most important questions to which the country must apply itself when peace was signed was that of coal conservation. It had been established by Sir Dugald Clerk, Prof. Cobb, and others that the most economical way of using coal was to distil it as was done in gas-works. Of the 210,000,000 tons of coal consumed in this country each year, only some 30,000,000 tons were so dealt with. In Plymouth, coal cost £2 16s. per ton, or, if bought in small quantities, 3s. 1d. per cwt.; and coal, if they could get it, yielded less warmth than the rationed equivalent of gas. He had not an ounce of coal in his house, and had not had since he went into the question more than a year ago. By the use of gas he was able to run the house on one servant less than formerly; and although he paid 3s. 10d. per 1000 c.ft., instead of the 2s. 10d. charged in Plymouth, it paid him handsomely to do it. Some people he found were worried about the possible competition from the Government scheme for super-electric stations and a local scheme for utilizing the water supply of Dartmoor for the generation of electricity. He had no fear of either. The local scheme, as he understood it, rested on the foundation that the sources of power in the rivers of Dartmoor were not utilized. This was quite true. It was equally true that there daily rolled up and down the Rivers Tamar and Plym enough power to supply all the light and heat which Plymouth needed. It was not utilized because it could not be profitably used; and the same thing would be found as to the waters of Dartmoor. The Government scheme for super-power stations was in a different category. It meant the waste of our greatest national asset—coal; and it would be prejudicial to the electricity industry as it now existed. What he objected to was that the Government should think of using money, which they were raising from a patient population at 5 p.ct. interest on the best security in the world, to compete with the gas industry, which was prevented by legislative control and administrative action from earning anything like this rate of interest. They were not opposed to the development of electricity. More than thirty years ago, when he was in Southport, he was instructed to report as to desirability of the Corporation, which owned the gas-works, undertaking the supply of electricity. He advised that they should, on the ground that it would help their gas undertaking. This advice was followed; and the two undertakings had flourished together. He had also a share in the establishment of the Plymouth electricity works, and had watched their development. The Gas Company made considerable use of electricity on the works; and they produced it at two-thirds less cost than they could buy it at, because they used for its production fuel which would otherwise be refuse. Electricity had its uses; but for cooking, heating, and street lighting gas would "knock it into a cocked hat."

THE BURDEN OF FREIGHTS.

The question of freight was one of immediate concern to the Company. In March and April they were compelled to buy six seaborne consignments of coal at a cost which took out of the pockets of the Company no less than £4600. If his information was correct, this money went to the Government. If that were to continue for the whole of the year, it would be a very serious thing for the gas consumers; and he hoped that it would be brought to the notice of Parliament with a view to getting it remedied. In conclusion, the Chairman paid warm tribute to the services of the staff, and in particular Mr. P. S. Hoyte (the Engineer) and Mr. Bolton (the Secretary).

A SHAREHOLDER asked if there was any probability of a siding being made from the adjacent railway into the works.

The CHAIRMAN replied that this was a question which had been deferred owing to the war; but they had now sealed an agreement with the Great Western Railway Company, and he hoped the siding would be made before the next annual meeting.

The report was then adopted,, the dividends recommended declared, and the retiring Directors re-elected.

BRITISH CYANIDES COMPANY, LTD.

An Expansion in the Turnover.

The Annual Ordinary General Meeting of the Company was held at the Cannon Street Hotel, E.C., last Friday—Mr. C. F. ROWSELL (the Chairman) presiding.

The report submitted, covering the year ended April 30, stated that the net profit for the twelve months was £20,572, to which had to be added the balance of £6069 brought forward from 1918 (after deducting Excess Profits Duty for 1917-18), making a total of £26,641. Out of this the Directors recommended the payment of a dividend on the ordinary shares at the rate of 10 p.ct. per annum, free of income-tax. The year under review was divided almost exactly on Nov. 11, and therefore covered two periods which were utterly dissimilar. The first was marked by the cumulative strain of the final months of the war, and the second by the difficulties incidental to the transition from war to peace production. In these circumstances, it was satisfactory to be able to record a further expansion over the whole period in the turnover arising from the sale of the Company's products.

The CHAIRMAN, on rising, apologized for the absence from the meeting of Sir Arthur Duckham, who had, however, just attended a somewhat lengthy Board meeting of the Company, thus showing the attention he gave to their affairs. This attention he had continued to give throughout the long period he had devoted to assisting the Government. Personally, he was rather glad to think that Sir Arthur Duckham would in future be free of Government duties, and so would be able to give even more of his valuable time to the interests of the Company. As to the accounts, the profit for the year of £20,572 compared with £36,725 for the previous twelve months. At the date of the armistice the Company were engaged in a very considerable way in the manufacture of an important chemical for the Government. Where it was necessary, as in this case, to rapidly organize plant and acquire raw materials to enable production on a substantial scale to be undertaken, very considerable expenditure had to be incurred; and if this manufacture had to be suddenly abandoned, there must be a loss of profit and capital involved. Owing to the action of the Government Department concerned, this was what actually happened with them; and the decrease in profits was more than accounted for by this fact. The Board had confidence in the justice of the claim which, on the advice of Counsel, was being put forward in the matter. Turning to the balance-sheet, they had spent £36,892 on new buildings. Their investments in allied companies now amounted to £94,692, as against £79,986 last year; the increase being chiefly due to the fact that they had paid up 10s. per share on their holding of British Potash shares and had increased their loan to Fred. Danks, Ltd., by £5000. The financial position of the Company, it would be seen from the balance-sheet, was thoroughly sound. The reserve account had been increased by adding to it the premiums on the shares recently issued; and the fund now stood at £23,000.

FUTURE PROSPECTS OF THE BUSINESS.

The experience of the past year had by no means diminished his confidence in the future of the Company. It had been a year of very great difficulty, in the first half of which all their efforts were concentrated on increasing the production of essential chemicals for which they were being urgently pressed by the Government and by many of the manufacturing companies in the country. This meant not only the development of existing plant, but in some cases of practically new processes. To carry out this development without diminishing the output was naturally a problem of the greatest difficulty; but it had been surmounted. The second part of the year had also been one of great difficulty, but of a different character. They had had to contend with the changing conditions of trade due to the signing of the armistice. One of the first results of this was to make everyone doubtful as to the future of prices, and generally as to the future of trade. Conditions such as these led to the restriction of purchases within the smallest limits compatible with the carrying on of business; and naturally the producer of chemicals felt this change. There were, however, indications that the demand for the Company's various products was again steadily on the increase; and it was expected that it would continue to improve. They had laid the foundations of their industry on thoroughly sound lines, and might look forward without fear to meeting competition in any of the special products which they laid themselves out to manufacture. The Board were more than ever satisfied that, in the purchase of Fred Danks, Ltd., they had exercised a wise discretion. As to the British Potash Company, this had given them a good deal of work during the past year. Negotiations were on foot which would, when completed, secure to the Potash Company large supplies of raw material. The position of that Company would then be secure; and the Directors were now satisfied that the production of muriate of potash on a large scale on competitive lines in this country would be assured. He moved the adoption of the report and accounts.

Mr. KENNETH M. CHANCE (the Managing-Director), in seconding the motion, said that during the first twelve months of the war the position of this country with regard to cyanide was very acute indeed. When the situation eased, the Company determined to devote themselves to other chemicals which were required for the war. After research work on a large scale, they succeeded in meeting the full requirements of the country for carbonate of potash of very pure quality for optical glass. They were quite unable to make their best quality from anything but the native supplies that they obtained from this country. The potash made at the Company's works was recognized to be far better than anything which had been produced by the Germans. Apart from what had been done in this direction, perhaps their most valuable work for the country during the war had been in connection with permanganate of soda. They were approached by the Anti-Gas Department to make this chemical, which had never before been produced except in the laboratory. It was wanted for anti-gas masks; and after experiment the Company were successful in making it on a large scale. When the war actually came to an end, the Company were employing a large amount of plant for this purpose; and what production they would have reached had the war gone on, he did not know. There was no doubt the whole chemical trade of this country was doing badly at the present time; but he believed that when peace was signed, and things settled down, the stocks they were now accumulating (unless they went ahead as fast as they could) would be insufficient to meet the requirements of the country. His opinion was that there was coming for the chemical trade in this country a remarkable period of prosperity, as soon as things got on the turn. Since the armistice the tonnage they had turned out had fallen by one-half; but its value had fallen by only one-third.

ATMOSPHERIC NITROGEN.

It would be remembered that some time ago capital was subscribed for trying out their method of fixing atmospheric nitrogen. The works erected had been put to another use during the war; but they had now got everything ready, and had obtained the further advice of Sir Arthur Duckham, which should be of the utmost value to them. The difficulty which had hitherto prevented real success was one on which Sir Arthur Duckham was perhaps the greatest expert; and as far as this point was concerned, Sir Arthur was certain he could get through.

The report was adopted, and the dividend recommended declared.

GAS AFFAIRS AT WISHAW.

The Resignation of the Gas Manager.

A Special Meeting of Wishaw Town Council was held on Monday evening of last week. The business before the meeting was the approval of the minutes of the Gas Committee in the matter of the resignation of the Gas Manager (Mr. Peter B. Watson)—as reported last week, p. 744.

The PROVOST (presiding), at the outset, said the members—only six of whom were present—had all been furnished with a copy of the minute; and it remained for the Council to approve or disapprove of it.

Judge FREW, as Convener of the Gas Committee, moved the approval of the minutes. In doing so, he said it had been suggested to him since the resignation of the Gas Manager became known, that there had been another "gas scandal." But he would like it to go out to the public that there had been nothing of the kind. There had been no scandal; and it was only fair to Mr. Watson to say that he had sent in his resignation not through any scandal, but because he differed from the policy agreed upon by the Committee. The Committee had submitted their policy to the Town Council, who had thought fit to back-up the Gas Committee. That being so, Mr. Watson could not see eye to eye with the Council and had tendered his resignation, which the Committee had accepted. There was no scandal, and Mr. Watson left the service of the Wishaw Town Council with a clear character; and he (Judge Frew) thought it was only fair to him that this should be said.

Bailie ANDERSON, in seconding, said he would like to emphasize what the Convener had said—that there had been no suggestion of any scandal in the gas-works whatever. There could not be any aspersion cast by them or by the public on their late Manager, Mr. Watson. What Judge Frew had said—that the whole matter had arisen out of their not being able to agree with the working policy of Mr. Watson—was entirely correct; and it was a matter that could quite well arise at any time between a manager and his employers. He thought it well that the Convener had taken the opportunity of making it known that the whole difference between their late Manager and the Council arose out of the working policy of the gas undertaking.

The minute was then unanimously approved of.

DEVIZES CORPORATION GAS UNDERTAKING.

Scheme for Increasing the Capacity and Efficiency of the Works.

Having been called in to inspect the Devizes Corporation Gas-Works, and to consider recommendations made by the Engineer (Mr. W. J. Rendell Baker) regarding the reconstruction of certain portions of the plant, Mr. W. Doig Gibb has presented a report, in which he says that after five years of war, the existing works are in better condition of repair than many of similar size; but, generally, their capacity and efficiency leave much to be desired. Even allowing that few extensions or alterations were possible during the war years, it is, he says, apparent that this period was entered upon with much of the plant inefficient, and some parts of its obsolescent. The works had not been kept up to date.

As to what requires to be done, Mr. Doig Gibb says that extensive and expensive renewals and alterations are needed to put the existing retort-house into proper repair, and to enable it to produce more gas. He agrees with the recommendation of the Engineer that, rather than do this, it would be better to make radical alterations in the methods of retorting, and bring these more up to date, by the introduction of a Guest-Gibbons stoker, and the replacement of the present single-ended retorts by a bench of 15 ft. through retorts; and that the reconstruction should be done now. Further, he approves of Mr. Baker's recommendations to remove the present ammonia plant, and to erect a tar-extractor, a Livesey washer, a scrubber washer, and a sulphate of ammonia plant. There is pressing need for more storage; and Mr. Doig Gibb approves of the Engineer's proposals to convert the smallest holder into a tar and liquor storage tank, to use the middle-sized holder for a relief holder for the water-gas plant, and to erect a new holder of 250,000 c.ft. capacity. The water-gas plant is of a very old pattern, and requires complete reconstruction. Mr. Doig Gibb strongly advocates the installation of "boosters," so that a constant and increased pressure may be maintained, irrespective of the position of the holders. The probable total cost of the whole of the work he puts at £30,912; but having regard to the present unsettled state of markets and possible contingencies, it would be advisable to count upon an expenditure of about £35,000.

GAS-HEATED APPLIANCES ASCEND IN PRICE.

The manufacturers of gas appliances have been compelled to make a substantial advance in the prices of their productions. The decision is a unanimous one; and the conditions which have led to it are set forth in the succeeding joint statement.

AN EXPLANATION.

It is now twelve months since we last advanced the prices of our various apparatus on account of the increased cost of production. Since then, there have been continual further substantial increases of cost, both of labour and material; and these have been greatly accentuated by the recent Government withdrawal of the subsidy on certain materials, which has reacted heavily upon the prices of our principal materials. In addition to this, output has been much decreased by

USE Simmance's

DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.

Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

AMMONIA AND TAR PRODUCTS.

CHAS. PAGE & Co., Ltd.

MERCHANTS. 47/51, KING WILLIAM ST., LONDON, E.C. EXPORTERS.

Suppliers of Benzol Washing Oil.

PICKS, WEDGES, HAMMERS, AXES, &c.

FORKS, GRAFTS, SHOVELS, SCOOPS, &c.

Tel. Add.: "YATONIAN."

Tel. Nos.: East 400, 401, & 402.

JOHN YATES & CO., Ld.,

Aston Manor, BIRMINGHAM,

MANUFACTURERS SINCE 1804

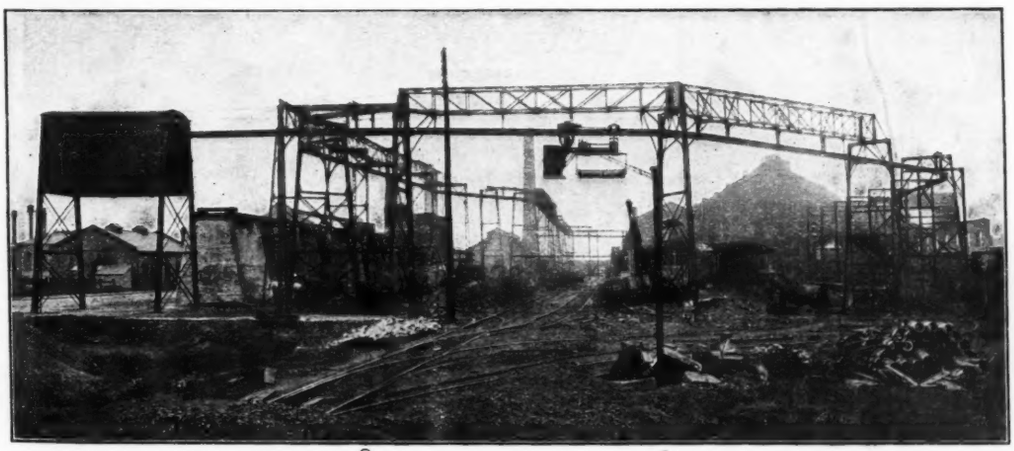
ALL BRITISH

VICES, CUTTERS, BUCKETS, BARROWS, SCREENS, &c.

GAS WORKS TOOLS & APPLIANCES of all kinds.

FOR HIGH SPEED CONVEYING WITH A MINIMUM OF LABOUR, POWER, & MAINTENANCE COST, USE

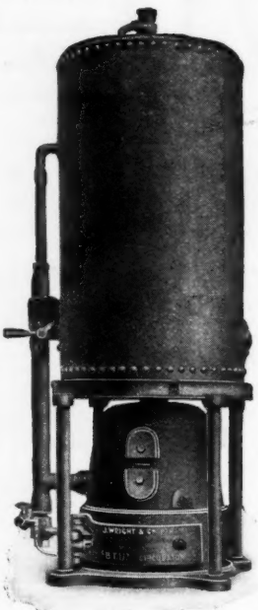
OUR MONO-RAIL TELPHER



In Use at:—

ALTRINCHAM, ABERDARE, AMSTERDAM, BECKTON, BIRMINGHAM, BLACKBURN, CARDIFF, DEVONPORT, DUNDEE, EXETER, GLASGOW, GREENOCK, HULL (GAS), HULL (ELECTRIC), KEIGHLEY, LEEDS, LEICESTER, LEA BRIDGE, LIVERPOOL, MANCHESTER (GAS), MANCHESTER (ELECTRIC), MERTHYR, MILL HILL, NEWPORT, POPLAR, PLYMOUTH, SOUTHPORT, STALYBRIDGE, STEPNEY, STOURBRIDGE, ST. PANCRAS, SOUTHAMPTON, SOUTH SHIELDS, STRETFORD, WALLASEY, WARRINGTON, WEST HAM, WEST HARTLEPOOL, WOLVERHAMPTON, WIDNES, WOOLWICH ARSENAL, WOOLWICH ELECTRIC, VICKERS LTD. ETC. ETC. ETC.

STRACHAN & HENSHAW, Ltd., BRISTOL.



WRIGHT'S "B.T.U."
HOT-WATER CIRCULATOR
AND STORAGE TANK.

THE "B.T.U"

For Soft-Water Districts

IS OFFERED WITH

COPPER
STORAGE
TANK :: ::

JOHN WRIGHT & Co.,
Essex Works, Aston,
BIRMINGHAM.

BRADDOCK'S PATENT "SLOT" METERS.

No. 261. Dry "Slot" Meter.

THE BEST SLOTS MADE.

No. 265. Wet "Slot" Meter.

J. & J. BRADDOCK (BRANCH OF METERS LIMITED), Globe Meter Works, **OLDHAM.**

Telegrams—"BRADDOCK, OLDHAM." National Telephone No. 815.

AND 45 & 47, WESTMINSTER BRIDGE ROAD, LONDON, S.E. 1.

Telegrams—"METRIQUE, LAMB LONDON." Telephone No. 2412 HOP.

the reduction of working hours, with a consequent serious increase of working expenses.

Notwithstanding all these adverse circumstances, we have up till now carried the whole of this extra burden ourselves, rather than make any further advance in prices—always hoping that conditions might so change as to render this unnecessary. Unfortunately, matters have become more difficult instead of easier; and, therefore, we regret to inform you that all our prices will be now advanced as below.

NEW TRADING CONDITIONS.

All unaccepted quotations are now withdrawn. To simplify matters, a revised list of prices will be prepared and issued as soon as possible, and which will permit of a discount being allowed to you. Meanwhile, the advances will be added to the invoices. Under these circumstances, we regret that we cannot make contracts for a period, or undertake to deliver any goods, except at such prices as may be ruling at the date of despatch. We hope these conditions will be acceptable to you, but in the event of their not meeting with your approval, we shall be willing for you to cancel any unexecuted orders.

THE PERCENTAGE ADVANCES.

All listed goods will be advanced a further 10 p.ct. on present prices. All net goods, including slot cookers, will be advanced 20 p.ct. on present prices. Enamelled goods and crown-plates, including the extra charged for enamelling gas-fires, will be advanced 33⅓ p.ct. over and above present prices. Copper and galvanized goods will be charged at prices ruling from time to time.

GENERAL GAS APPLIANCES, LTD.

There has been registered at Somerset House, with a nominal capital of £100,000 in £1 shares, a Company with the title of General Gas Appliances, Ltd.

From particulars which were given in last Tuesday's "Financial News," it appears that the objects of the Company are to take over the business of gas-stove manufacturers carried on by the Planet Foundry Company, Ltd., at Guide Bridge, near Manchester, with the benefit of an agreement between that Company and W. R. Francis and S. C. Whitfield, and to carry on the business of founders, gas, heating, lighting, and general engineers, stove manufacturers, pottery, glass, firebrick and appliance manufacturers, &c. The subscribers (each with 1000 shares) are: W. H. Locke, No. 119, Withington Road, Whalley Range, Manchester, traveller. W. R. Francis, No. 60, Victoria Crescent, Eccles, Manchester, traveller. The Planet Foundry Company, while holding 6000 shares, may appoint one Director. Qualification of other Directors, £1000. The first Directors are not named.

S. C. Whitfield, W. R. Francis, W. H. Locke, and W. H. Liggins have each a personal option to take any amounts due to them as salaries, fees, or bonuses in shares at par until they have each so acquired 6000 shares. If there be any issue of capital after the first issue, the Planet Foundry Company, Ltd., are to have the option of acquiring 6000 further shares for cash at par. All these options lapse ten years after the incorporation of the Company. No notice of the situation of the registered office has yet been filed.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *June 23*.

In the London market, pitch retains a strong position; ships are regularly being loaded; and there are inquiries for next season's shipment. With regard to solvent naphtha, the demand is only moderate, in view of the temporarily reduced needs of the rubber trade. The value is about 2s. 4½d. per gallon net and naked. Motor benzol is in good request; but there is only small inquiry for pure toluol—the value being about 2s. 9d. net and naked. Crude carbolic acid cannot be economically produced at the price which the crystal makers would be willing to pay for it. Creosote is steady at about 5½d. net per gallon in bulk.

For the home agricultural trade, sulphate of ammonia is in request, and the value generally is now put (specially for this purpose) on the basis of £19 10s. per ton for 24½ p.ct. quality to farmers—10s. less to factors. For industrial purposes, a much higher figure is obtainable. The official prohibition against export is still in force.

Tar Products in the Provinces.

June 23.

The average values for gas-works products during the week were: Gas-works coal tar, 34s. 6d. to 39s. 6d. Pitch, East Coast, 56s. to 58s. 6d. per ton f.a.s.; West Coast—Manchester 48s. to 50s.; Liverpool, 48s. to 50s., Clyde, 55s. to 57s. 6d. nominal. Benzol 90 p.ct., North, 1s. 8d. to 1s. 10d.; crude, 65 p.ct., at 120° C., 11d. to 1s. naked at makers' works; 50-90 p.ct. naked, North, 1s. 8d. to 1s. 10d. Toluol, naked, North, 2s. to 2s. 1d. nominal. Coal tar crude naphtha in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 11d. Heavy naphtha, North, 2s. 3d. to 2s. 5d. Creosote in bulk, North, liquid, 5d. to 5¼d.; salty, 4¼d. to 4¾d. Heavy oils, in bulk, North, 6d. to 6½d. Carbolic acid, 60 p.ct., unsaleable. Naphthalene, £16 to £18; salts, £5 to £6, bags included. Anthracene "A" quality, 7½d. to 7¾d. per minimum 40 p.ct.; "B" quality, 2d. nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

Markets are rather quiet at the moment; the holiday season having its usual effect. Pitch, however, is an exception, having developed further strength with the promise of yet another advance to come in

Gas and the Housing Problem.

PENDING the necessary provision of new houses, the best has to be made of existing accommodation. The essential economy of space is secured by the use of the ideal Cookers in present circumstances — Main's "Kent," "Sussex" and "Surrey." These efficient and compact cookers embody all recent improvements and are designed with a view to securing the minimum cost for maintenance.

R. & A. MAIN, LTD.

WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE.

the very near future. These remarks apply particularly to Provincial centres; and the road authorities, who have delayed making their contracts until quite recently, have been called upon to pay some 30 to 40 p.ct. more than they need have done. West Coast prices have advanced rapidly of late, and some of the optimists are talking of 60s. in Manchester within the next couple of weeks. London remains without much change. I have pointed out before that pitch is practically the only bye-product which has not had a material advance during the war period; and in considering the general run of values, occasioned by the heavy increase in cost of production, and as exemplified by other products, pitch would not be out of proportion at £4 per ton. Benzol is very firm; the motoring and aeronautical trades providing an outlet for the makes. The future depends on the course of petrol; but this can hardly fall further on this side for some time to come. The specification is not changed yet, and the public still require to be educated to the superior value of benzol. There is nothing really new in the use of benzol in motor and aero engines; but the public need to be brought to understand its very solid advantages in comparison with petrol. During the war very many experiments were carried out to discover a fuel which would prove ideal for aero engines. The blending of moderate proportions of benzol with gasoline was found to be distinctly advantageous with the type of engines then used; and fuel of this class would undoubtedly have been employed for all internal combustion engines had the war continued much longer. A special fuel was produced which was given the name of "Hector," and was a mixture of cyclohexane and benzol. This gave indications of marked superiority over any other product tested, and should, unless unforeseen deficiencies appear, prove ideal for aeronautical (as well as motoring) service. In some experimental flights this fuel has given a speed ten miles an hour greater than could be obtained through the use of any other fuel. Carbolics are absolutely featureless and still practically hopeless; and this unfortunate position seems to be extending to cresylic acid, although, in comparison with the former, the price of the latter is quite good, despite the recent fall. Naphthas remain quiet with very little alteration in values; while naphthalenes, especially crude, are marking time pending the resumption of demand from the fire lighter trade, which should come along again in a few weeks' time. At present, refined continue on offer, and crudes are not readily disposed of. Other products are unchanged.

The range of quotations is as follows:

Benzol: 90% London 2s. to 2s. 2d., North 1s. 11d. to 2s.; 50-90% 1s. 9d. to 2s. London, 1s. 9½d. North; crude 60-65% 1s. 3½d. to 1s. 5½d.; pure, 3s. per gallon naked.

Carbolic Acid: Crude 60's unsaleable; crystals 40%, 4d. per lb. asked.

Crude Tar: London, 44s. to 46s.; Midlands, 40s. to 42s.; North 40s. per ton *ex* works.

Pitch: London, 67s. 6d. to 70s. per ton; East Coast, 54s. to 56s. per ton, West Coast, 51s. to 53s., with Manchester 52s. per ton and Glasgow 53s. 6d. per ton; South Wales, 63s. to 65s. per ton.

Solvent Naphtha: London, 2s. to 2s. 1d. Provinces average 2s. per gallon.

Crude Naphtha: Naked, 10d. per gallon.

Heavy Naphtha: 2s. 3d. per gallon.

Naphthalene: Refined, £15 to £17 per ton nominal; crude, £3 10s. to £8, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North 2s. 7d.

Creosote: London, 7¾d.; North, 5¾d. to 6¼d.; heavy oil, 6d. per gallon in bulk.

Anthracene: 40-45%, 6d. to 8d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 2d. per lb.

Cresylic Acid: 95%, 2s. 4d. to 2s. 6d.; 97-99%, 2s. 7d. to 2s. 9d. *ex* works London, f.o.b. other ports.

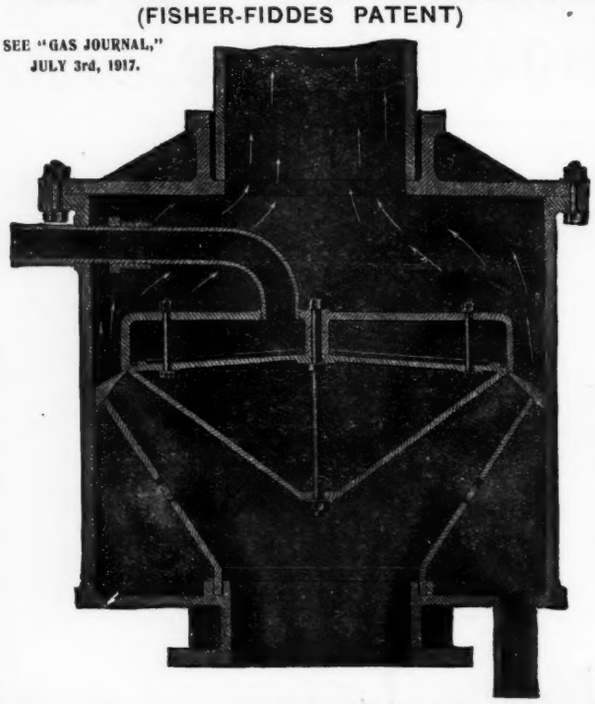
Sulphate of Ammonia.

There is little fresh news in sulphate. An agreement has been arrived at between makers of sulphate of ammonia and the Board of Agriculture by which the former agree to reserve their output for home agricultural use at prices to be agreed from time to time, while export licences are to be freely issued for the surplus not required at home. The terms of the agreement, which expires at the end of May next year, follow closely the lines indicated in these reports some time ago. Taking everything into consideration, the price fixed for 24½ p.ct. ammonia—viz., £19 10s. per ton—seems to be satisfactory for the present; but the position after September is indefinite, although lower prices are hardly likely before March or April next year.

British Dyestuffs Corporation Capital.—Proposals to increase the capital of the British Dyestuffs Corporation, Ltd., to £8,000,000 by the creation of £2,000,000 additional preferred ordinary shares of £1 each, and to £10,000,000 by the creation of £2,000,000 additional preference shares of £1 each, were unanimously agreed to at an extraordinary general meeting of shareholders at Manchester last week. Lord Moulton (the Chairman), who moved the resolutions, said the new capital was needed in view of the very important work the Company had to do in the future.

Accident at the Rochdale Gas-Works.—An accident of a rather serious character occurred recently at the Rochdale Corporation Gas-Works in connection with the bye-products plant. James Marsh, aged 50, employed by Messrs. Thomas Hill & Sons, boiler-makers, of Heywood, was engaged at the gas-works carrying out some repairs to a naphthalene tank. After placing hot rivets in the tank, Marsh went down through the manhole to inspect his work from the inside—carrying with him a lighted candle. Unfortunately, as the result of the vapour from the tank coming into contact with the light, a fire occurred and severely burned Marsh about the face and hands. After first-aid treatment had been rendered, the injured man was conveyed to the Rochdale Infirmary, where he was detained.

"TAR FOG" & TAR EXTRACTOR
(FISHER-FIDDES PATENT)
SEE "GAS JOURNAL," JULY 3rd, 1917.



FOR THE
ELIMINATION OF
TAR & TAR FOG
FROM COAL GAS AND
OIL VAPOURS
FROM C.W. GAS
WHY NOT TRY THE
NEW METHOD
AUTOMATIC
EFFECTIVE &
INEXPENSIVE
PARTICULARS AND PRICES FROM
R. & J. DEMPSTER, LTD., MANCHESTER.
Temporary London Office: BLENHEIM MANSIONS, BROADWAY, WESTMINSTER, S.W. 1.
London Office Telephone No. Vic. 7426.

Water-Gas Plant for Colwyn Bay.—The provision of a water-gas plant at the gas-works has been approved by the Colwyn Bay Urban District Council, in view of the great difficulty in procuring coal and the increase in the cost of the present output of gas. The outlay on the new plant is estimated by the Engineer (Mr. J. Smith) at between £2500 to £2750.

Swadlincote Gas Undertaking.—The Swadlincote Urban District Council have decided to lay down a new gas plant at a cost of £2244, in order to increase their output by 200,000 c.ft. per day. They have also agreed to increase the salary of the Gas Manager (Mr. F. Robinson) from £275 to £325 per annum; there being a strong feeling that the increase is well merited.

Vertical Retorts for Falkirk.—The Falkirk Town Council having decided to substitute vertical retorts for the present installation of horizontals at their gas-works, a deputation is to visit Uddingston, Aberdeen, Oldham, and Barrow-in-Furness, where different types of vertical retorts are in operation. It will then recommend to the Council the kind that should be adopted.

Fatal Accident to a Gas Manager's Son.—Much sympathy will be expressed with Mr. J. R. Duff, the Engineer of the Banbury Gas Company, on the sad ending to a holiday at Morecambe, where he was formerly Gas Manager. According to the evidence given at an inquest last Wednesday, his son Cyril, aged ten, while running across the road to get into his father's motor-car, fell on some stone-chippings which had been tarred, ready for the road-roller. He bruised his knee; and blood-poisoning supervening, followed by pyæmia, he died on the 16th inst. A verdict of "Accidental death" was returned.

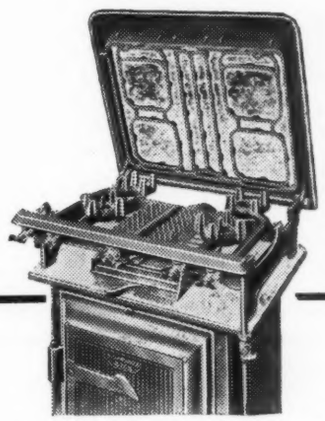
Finances of the Heywood Gas Undertaking.—At the last meeting of the Heywood Town Council, Alderman Healey, referring to the report of the Borough Treasurer, which stated that the profit on the gas undertaking for the year ended March 31 last was only £266, said it had been decided to increase the price of gas by 6d. per 1000 c.ft. commencing with next quarter. An increase of 1d. meant about £500; so that the total amount of the increased revenue would be about £3000. The Gas Committee, he said, could already see an extra expenditure of £2500 for increased wages and rates and taxes. They did not know what extra cost there would be for coal; but they were hoping that with the 6d. per 1000 c.ft. extra they would be able to make ends meet.

Gas-Works Results at Droitwich.—Mr. W. H. Wise has presented to the Gas Committee his first annual report as Manager of the Droitwich Gas-Works. In it he says that the gas manufactured during the year ended March 31 amounted to 33,350,400 c.ft., which was an increase of 2·1 p.ct. on the preceding year. Sales, at 29,914,692 c.ft., showed a decrease of 1·14 p.ct. There was a falling-off in make of 400 c.ft. of gas per ton of coal carbonized, largely owing to the coal not being up to pre-war standard. Coal and wages show an increased expenditure of £2350 as compared with 1914; and until the price of gas was increased in April last, no provision had been made to meet this extra expenditure. These two items mainly account for a deficit on the year's working.

Misfortunes of the Primitiva Gas Company.—The City Notes of "The Times" last Tuesday contained the following: Misfortunes, it is said, never come singly; and certainly some concerns seem never to be at the end of trouble. The Primitiva Gas Company's works at Buenos Ayres, we learn, were closed-down on the 12th inst. owing to strikes. The Company's troubles began with the outbreak of war. The Municipality failed to pay its gas bill; and the amount owing to the Company at the end of 1918 was no less than $1,200,000. In addition, the Company, though it has had to pay very much higher prices for coal and stores, has been prevented from raising the pre-war price of gas, though the German-owned electricity company is allowed to charge a sliding-scale. Last December a decree was passed by the Municipality practically cancelling the Company's concession. The latest misfortune, however, cannot last long; and perhaps the end of the strike may witness a turning point in the Company's career.

South African Lighting Association, Ltd.—The thirtieth annual meeting of this Company will be held to-morrow at the London offices, when the Directors will be able to report that the improvement in the Company's business has continued. The sales of gas at both stations showed last year a substantial increase on the quantity sold in the previous twelve months. The price of gas at Port Elizabeth was reduced by 5d. per 1000 c.ft. for the whole of last year; and at Grahamstown by 10d. for six months. There was some increase in the cost of colonial coal, and wages also advanced to a substantial extent. But the larger volume of business, and the improved prices realized for residuals, materially assisted as an off-set to the increased charges. The Directors have applied the sum of £1100 from profits in writing-down the investments to market value as on Dec. 31, and they again recommend the payment of a dividend at the rate of 10 p.ct. for the year, less income-tax. An interim dividend of 4 p.ct. was declared last October; and the balance dividend now payable will amount to £5400—leaving to be carried forward to next year £6098.

Tottenham Gas Company's War Work.—A representative of the "Tottenham Weekly Herald" has interviewed Mr. A. E. Broadberry, the Engineer and Manager of the Tottenham District Light, Heat, and Power Company, and as the result has been able to publish some figures relating to the Company's contribution towards the winning of the war. The benzol supplied to the Government and turned into high explosives was sufficient to charge 2,214,000 18-pounder shells; while the toluol converted into "T.N.T." was capable of charging 510,674 of the same class of shell. Then there was the concentrated ammonia, which was converted into "ammonal" sufficient to charge 6,460,000 18-pounder shells. Thus the total number of this class of shell that could have been filled—if only this size had been used in the operations of war—was 9,184,674. Not only so, but the Company actually manufactured 18-pounder shells to help the authorities over the period of shortage in the early part of the struggle until the shell factories proper could get into regular working order. Also a great deal of sand-blasting and work for other munition firms was done, as many as 434,534 different parts having passed through the shops.



"Economic" Cooker with Hotplate raised.

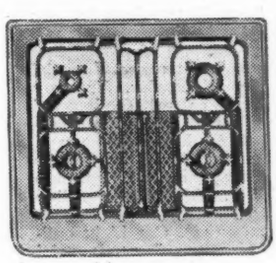
Gas Cooker Efficiency

Introduced in 1914, the "Economic" Cooker was the first successful scientific attempt to improve the thermal efficiencies.

"Hourly consumptions have been reduced and heat efficiencies raised."—"GAS JOURNAL," *March* 10, 1914.

No results published since have equalled the "Economic" figures.

A few copies are available of the "Evolution of the Gas Cooker," issued in 1914, which describes the "Economic" and gives Laboratory and Domestic tests.



Plan of Hotplate.

THE RICHMOND GAS STOVE & METER CO., Ltd.

Warrington and London.

Beighton Ovens, Ltd.—This is the title of a Company registered, with a capital of £150,000 in £1 shares, to take over the business of manufacturers of coke and residuals or bye-products of coal carried on by the Sheffield Coal Company, Ltd. The office is at No. 19, St. James' Street, Sheffield.

Gas Finances at Dundee.—At a meeting of the Gas Committee of the Dundee Town Council, it was stated that the past financial year was a record one. The income reached the high figure of £232,835, or £26,200 over the previous year. The expenditure showed a large increase; but an adverse balance of £1779 had been cleared off, and a balance of £345 was carried forward. A reduction in the price of gas is proposed of 4d. per 1000 c.ft., making the rate 2s. 11d. In the estimates for next year a saving is allowed for of £5300 for coals, although the price is entered at 3½d. more per ton. The income from residuals is estimated at £50,300, or £5000 more than the year just closed. It was stated at the meeting that Mr. Alex. Yuill, the Gas Engineer, had effected a saving on coals and had increased the yield of bye-products. The Convener of the Gas Committee spoke in complimentary language of Mr. Yuill's effective management.

Gas Stock at Auction.—We learn that Messrs. A. & W. Richards intend to hold their regular sales by auction of gas stock at the Cannon Street Hotel, now that the Auction Mart is no longer available. At their sale last Tuesday, the firm disposed of £25,000 of 6 p.ct. redeemable preference stock of the Brighton and Hove Gas Company at from par to 101¼—a very satisfactory result in view of the attractions of the Victory Loan and Bonds, and the way everyone is being urged to subscribe to them.

Old Directors at Worksop.—At a meeting of the Worksop Gas Company last Thursday, two changes were made in the directorate. The resignations were received of Mr. T. Marris, the Chairman of the Company, and Mr. J. Jones. In their places, Mr. C. Marris (son of the late Chairman) and Mr. C. A. Longbottom were elected. The Company was formed in 1854; and the first Chairman was a member of the Marris family (Mr. T. Marris), who held the position until 1873. He was then succeeded by his son, who is now retiring after having held the chairmanship of the Company for 46 years. Mr. Jones's retirement from the directorate is due to old age—he having already celebrated his 92nd birthday.

STOCK MARKET REPORT.

THE Stock Exchange has had a quiet week; one potent factor contributing thereto being the counter-attractions of Ascot. The general tone of most markets was decidedly dull, so that they furnished little attraction in themselves.

In the gilt-edged market, Home Government issues were very dull, in consequence of pressure of sales for reinvestment in the Loans. The fall was most pronounced in the earlier part of the week; the 5 p.ct. loan going below 94, Consols marking 52⅛, and the rest receding generally. But before the close there was a partial recovery. Indians and Colonials were marked to relative levels. Bank stock touched 195. Home Rails, both ordinaries and prior charges, had a similar fall, from which the ordinaries made some recovery, but the priors remained down. Canadians were irregular, and Argentines weakened.

The Miscellaneous Market was the brightest. Oils were full of go, and several concerns showed great strength. Rubbers, after a bad start, rallied somewhat. Recent advances in Shipping brought realizations to secure profits, and Insurance companies were rather easier.

Business in the Gas Market was so inactive as only to be equalled by the remarkable quietude of the previous week; there was just a tie between in the numbers of bargains in the quoted securities—about a dozen per day. There was no very noticeable incident observable; but the general tendency was rather easier. Perhaps some holdings were being realized to provide money for investment in the new Loans. In the Metropolitans and Suburbans, Gas Light ordinary was easier, and the quotation dropped 3; but the other issues were steady. South Metropolitan also lost a point, and Tottenham "B" 1½. Imperial Continental weakened and changed hands on Friday at 138—denoting a fall of 4. But the debenture rose 1. European was very firm, and advanced ½. Cape Town was ¼ better. Primitivas were weaker; the news of strikes occasioning the closing-down of the works having a chilling effect.

Bargains done for cash during the week were as follows: On Monday, European 14⅝, Gas Light ordinary 60⅜, Imperial Continental 140, 140½, 141, 142, Malta and Mediterranean 71s. 3d., Primitiva 35s., ditto preference 65s., 66s. 3d., 67s. 6d., South Metropolitan 61. On Tuesday, Bombay 5⅛, 6, European 14½, 14⅞, Gas Light ordinary 59½, 59⅞, 60, 60⅜, ditto preference 70½, ditto debenture 55, Imperial Continental 140. On Wednesday, European 14½, Gas Light ordinary 59, 59¼, 60, Imperial Continental 139, 139½, 140, 140½, ditto debenture 75, Liverpool 64, Monte Video 13¾, Primitiva debenture 71, 71½, Broadstairs 10 p.ct. "A" 49, ditto 7 p.ct. "B" 39, ditto new 39, ditto "C" 39, ditto "D" 39, ditto 5 p.ct. debenture 80, Pinner 7 p.ct. "B" 5⅜. On Thursday, European 14½, Gas Light ordinary 58, 59, ditto preference 70½, 71, Imperial Continental 139, 140, 140½, ditto debenture 75½, Primitiva preference 62s. 6d., ditto debenture 71¼, 71½, South Metropolitan 61½, Waltham Abbey and Cheshunt 7 p.ct. "B" 88s. 9d., 90s. On Friday, British 30⅜, European 14½, 14⅝, 14⅞, Gas Light ordinary 56, 57, ditto preference 70, Imperial Continental 138, 139, 139½, 140, Primitiva 36s. 3d., ditto preference 63s. 9d., ditto debenture (1911) 51.

In the Money Market, the general position, subject to slight fluctuations, was firm both for short loans and discount. The Bank rate is 5 p.ct., as fixed on April 5, 1917.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares.	When ex-Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
183,049	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	62—67	..
1,551,868	"	April 8	2½	2½%	Alliance & Dublin Ord.	59—64	56—60	..
874,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76—79	61—68	..
280,000	5	April 29	7½	8%	Bombay, Ltd.	5⅞—6⅜	6⅜—6½	5⅛—6⅛
50,000	10	Feb. 26	16	12%	Bourne-mouth Gas and Water { 10 p.c.	29—30	20—22	..
888,119	10	"	7	7%	B ¶ p.c.	15—15½	10½—11½	..
115,000	10	"	6	6%	Pref. 6 p.c.	13½—14	9½—10	..
159,740	—	—	—	4%	4 p.c. Deb.	..	66—68	..
992,046	Stk.	Feb. 26	14	37/-	Brentford A Consolid.	361—366	74—77	..
784,920	"	"	11	31/8	Do. B New	204—209	68—71	..
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	78—88	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—98	64—66*	..
214,775	"	Feb. 26	11	7½%	Brighton & Hove Orig.	208—218	137—142	..
244,400	"	"	8	5½%	Do. A Ord. Stk.	154—159	94—99	..
933,500	Stk.	"	5	5%	Bristol 5 p.c. max.	..	..	..
580,000	20	Mar. 26	12½	10%	British	44—45	30½—31½	30⅝
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	64—66	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	55—57	50—53	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	5½—6	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	¶—7½†	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	62—67	..
187,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,518,280	"	Feb. 12	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	62—65	..
560,000	"	"	5⅓	26/8	Do. 5½ p.c. do.	108—105	58—61	..
475,000	"	June 11	8	8%	Do. 8 p.c. Deb. Stk.	69½—71½	50—52*	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	48—53	..
200,000	"	"	7	—	Do. ¶ p.c. Pref.	115—118	70—75	..
51,600	Stk.	Aug. 29	14½	12½%	Croydon A 10 p.c.	..	155—165	..
278,400	—	"	11½	9½%	Croydon B and C ¶ p.c.	..	130—185	..
492,270	Stk.	—	6	6⅓%	Derby Con. Stk.	138—126	..	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	..	..
1,009,180	10	July 29	10	6/0	European, Ltd.	17½—16	14—15	14⅛—14⅞
16,398,975	Stk.	Feb. 10	4/17/4	30/-	Gas Light and Coke { 4 p.c. Ord.	98—103	57—59	56—60⅝
2,600,000	"	"	8½	26/8	5½ p.c. max.	76—79	55—57	..
4,062,235	"	"	4	4%	4 p.c. Con. Pref.	96—99	70—72	70—71
4,674,850	"	June 11	8	8%	8 p.c. Con. Deb.	72½—74½	55—57*	55
180,000	"	"	10	10%	10 p.c. Bonds	..	..	..
82,500	"	Mar. 12	5	4⅕%	Hastings & St. L. 5 p.c.	..	59—64	..
258,740	"	—	3½	2⅓%	Do. 3½ p.c	87—89	44—49	..
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	16½—16½	¶—8	..
86,600	Stk.	Sept. 12	9	8⅓%	Hornsey ¶ p.c.	..	115—120	..
181,000	"	Mar. 12	7½	5⅓%	Ilford A and C.	151—154	90—95	..
65,780	"	"	6½	4⅓%	Do. B	115—118	69—74	..
55,500	"	June 26	4	4%	Do. 4 p.c. Deb.	92—94	62—65	..
4,940,000	"	May 14	9	4½%	Imperial Continental	150—160	138—143	138—142
1,925,000	"	Feb. 12	8½	8½%	Do. 8½ p.c. Deb. Red.	84—86	74—76	75—75½
285,242	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	90—95	..
2,498,998	"	Feb. 26	10	42/6	Liverpool 5 p.c. Ord. { A	211—213	..	..
306,088	"	June 26	4	4%	Do 4 p.c. Pr. Deb. Stk.	146—148	..	64⅝
165,736	"	Feb. 17	7/5/8	32%	Maidstone 5 p.c.	..	58—68	..
75,000	5	June 11	5	3⅓	Malta & Mediterranean	4½—4⅝	3½—3⅝	71/3
250,000	100	April 1	4½	4½%	Mex. of Melbourne { 6½ p.c. Deb.	98—101	90—97	..
541,920	20	May 29	4	5%	Monte Video, Ltd.	11½—13	13—14	13⅛
1,878,892	Stk.	July 29	4½	3⅓%	Newcastle&Gatsh'dCon.	98½—99½	67—69	..
539,705	"	June 26	3½	3⅓%	Do 3½ p.c. Deb.	3½—83	57—59	..
15,000	10	Mar. 18	—	11%	North Middlesex 10 p.c.	..	13½—14	..
55,940	10	"	7/14/0	7%	" " 7 p.c.	14—15	9½—9⅞	..
800,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	101—104	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅝	4⅞—5⅛	..
60,000	50	Feb. 26	18	7½%	Porteea, Island B	128—131	76—81	..
100,000	50	"	12	6⅓%	Do. C	118—121	68—63	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	1⅛—2	35/—36/3
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4⅞—5	3—3½	62/6—67/6
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—98	71—73	71—71½
600,000	Stk	July 31	4	4%	Do. " " 1911	..	50—53	51
946,198	"	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	50—53	..
150,000	10	May 14	6	6/	San Paulo { 6 p.c. Pref.	10½—11	¶—8	..
126,000	50	July 1	5	5%	5 p.c. Deb.	47—49	41—43	..
185,000	Stk.	Mar. 12	10	5%	Sheffield A	228—234	80—84	..
909,984	"	"	10	5%	Do. B	222—224	80—84	..
528,500	"	"	10	4⅔%	Do. C	220—222	71—74	..
183,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
90,000	10	May 28	9	10%	South African	10½—11½	13—14	..
6,609,898	Stk.	Feb. 10	5/4/0	30/-	South Met. 4 p.c. Ord.	111—113	60—62	61—61½
250,000	"	July 12	—	5%	Do. Pref.	..	96—98	..
1,896,445	"	July 10	8	8%	Do. 3 p.c. Deb.	72½—74½	54—56	..
224,820	"	Feb. 26	8½	6⅔%	South Shields Con. Stk.	157—159	99—101	..
962,795	"	"	6	3⅔%	S'th Suburb'n Ord. 5 p.c.	114—116	76—79	..
197,558	Stk.	June 26	6	6%	Do. 5 p.c. Deb. Stk.	116—118	89—92	..
647,740	"	May 14	7½	8%	Southampton Ord.	99—102	67—69	..
121,275	"	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	..	64—66	..
190,000	"	Feb. 12	—	4⅔%	Tottenham A 5 p.c.	185—188	90—95	..
762,275	"	"	6	3⅔%	District { B 3½ p.c.	115—117	63—66	..
181,355	"	June 26	4	4%	4 p.c. Deb.	87—89	64—66*	..
182,880	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	102½—109	83—85	..
80,000	"	Feb. 26	8⅔	55/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	88—93	..
255,688	"	"	6½	40/-	Do. B 3½ p.c.	129—134	68—73	..
108,075	"	"	—	38/6	Do. C	..	68—73	..
140,665	"	"	—	3⅔/6	New Ordinary	..	68—73	..
259,000	"	"	6½	35/ 9	Wimbledon 5 p.c.	117—122	64—73	..
98,000	"	"	6⅔	40/-	Epsom 5 p.c.	121—126	70—75	..
88,416	"	June 26	6	5⅔	5 p.c. Deb. Stk.	66—69	50—52	..

* Ex Div. † Ex Arrears.

As the result of a strike of gas workers at Mountain Ash, that town, together with Miskin and Penrhiwceiber, was left without gas last Thursday night.

A new Masonic Lodge—the Croham Hurst Lodge, No. 3968—was consecrated on the 5th inst. The twenty-four Founders were principally drawn from golf devotees attached to the well-known Croham Hurst Club; and the regular meeting-place will be at the Club House, Croydon. W. Bro. George Hands, I.P.M. of No. 1851, was installed as first Master.

In the minutes which were adopted at the last monthly meeting of the Widnes Town Council, the Gas Committee recommended that thanks be accorded Captain Robert Carr, M.C., R.E., for the services rendered to the department by him since the death of Mr. H. H. Mercer (Assistant Manager), and that an honorarium of £50 be granted to Captain Carr in respect of such services.

The Hebden Bridge and Mytholmroyd Gas Board are purchasing £22,820 of their 3 p.ct. redeemable stock from the West Yorkshire Bank at £66 10s. per £100. The purchase money is being obtained by realizing the redemption fund investments held for stock redemption fund purchases.

At a meeting of shareholders of the Comrie (N.B.) Gaslight Company it was decided not to pay any dividend this year. It has been found necessary to raise the price of gas from 8s. 4d. to 9s. 2d. per 1000 c.ft. owing to the poor quality and high price of coal, and the difficulty of obtaining cannel coal.

The Directors of the European Gas Company, Ltd., have decided (subject to audit) to recommend the payment of a dividend of 5s. per share, free of income-tax, on Aug. 1 next, which with the interim dividend paid on Feb. 1 last will represent a total dividend of 5 p.ct. free of income-tax for the past financial year.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under (about 40 words) 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom	Advance Rate:	28/-	15/-	8/8
	Credit Rate:	32/-	16/-	9/6
Abroad (in the Postal Union) Payable in Advance		32/6	17/-	10/-

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON
FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE
PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LTD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C. 2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

FOR Supplies of SULPHURIC ACID,

ASK BERK.

W. BERK & CO., LTD., 1, FENCHURCH AVENUE, LONDON, E.C. 3.
Works: STRATFORD, LONDON. MORRISTON (GLAM.).
Phone: 4092 Avenue. Tele: "Berk, Phone London."

ALDER AND MACKAY, LTD.
(ESTABLISHED 1850.)
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.
EDINBURGH.
(See p. 830.)

HUTCHINSON BROTHERS, Ltd.,
FALCON WORKS, BARNSLEY.
MANUFACTURERS OF
GAS METERS (Ordinary and Prepayment), "FALCON" INVERTED LAMPS for Street Lighting, INVERTED BURNERS and CONVERSION SETS for Street Lamps.

JAMES MILNE & SON, LTD.,
(ESTABLISHED 1750.)
SLOT AND ORDINARY DRY METERS.
EXTENSIVE RANGE OF USEFUL GAS-WORKS' ACCESSORIES.
EDINBURGH, GLASGOW, and LEEDS.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

BENZOL PLANTS FOR GAS-WORKS.
BAGLEY, MILLS, & CO., Ltd.,
92, Victoria Street, Westminster, S.W. 1, Invite inquiries from all Gas-Works making 75 million cubic feet and upwards per annum.

SULPHURIC ACID.
SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD., with which is amalgamated WM. PEARCE & SONS, LTD., Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1588 AVENUE (3 lines).

BRITISH GAS PURIFYING MATERIAL.
ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BRITISH GAS PURIFYING MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)
18, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmer's Green 608.

"FERROX." "FERROX." "FERROX."
A BRITISH Oxide Cheaper and Better than Bog Ore. 35 per cent. Water, 75 per cent. Ferric Hydrate.
For Sale outright or on Loan.
OXIDE LIMITED, Brentford, MIDDLESEX.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CHEMICAL PLANT ENGINEERS, BOLTON, LANCS.
Telegrams—"SATURATORS, BOLTON," Telephone 0848.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.
Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

SPENCER'S Patent Inclined HURDLE GRIDS.
THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement. May 27, p. 519.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol. Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

ENQUIRIES SOLICITED.
FOR Gas-Works Plant of Every Description; also SULPHATE OF AMMONIA and SULPHUR RECOVERY PLANTS.
C. & W. WALKER, LIMITED, DONNINGTON, NEWPORT, SALOP.

MEWBURN, ELLIS, AND PRYOR.
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70, Chancery Lane, London.
Telegrams: "Patent, London." 'Phone: 248 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

TULLY'S PATENT.
CARBURETTED HYDROGEN PLANT for 300 to 500 B.Th.U.
COMPLETE GASIFICATION OF COAL.
BALE AND HARDY, LTD.,
33, VICTORIA STREET, LONDON, S.W. 1.

EXTENSIONS.—Gas-Works requiring Alterations or Additions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, 15, Park Row, Leeds, who make a Speciality of Gas Apparatus, Coke-Oven Plant, and Structural Steel Work. Inquiries Solicited. Satisfaction Guaranteed. Telephone No. 22579, LEEDS.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, ROSE MOUNT IRONWORKS, ELLAND.

JOHN RILEY & SONS, Limited, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 60 years. Reference given to Gas Companies.

PATENTS — Inventors, Advice and Handbook free.
KING'S PATENT AGENCY, LTD., 165, Queen Victoria Street, London, E.C. 4.

CORRESPONDENCE TUITION in GAS ENGINEERING for City and Guilds Institute Exams. (Preliminary and Final). Successful Results. Low Fees.
PENNINGTONS ENGINEERING TUTORS, 254, Oxford Road, MANCHESTER.

APPOINTMENTS, &c., WANTED.

WHEN Filling Vacancies, please REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, has the FIRST CALL ON YOUR CONSIDERATION.

DISTRIBUTION.—Chief Clerk and Correspondent invites correspondence with view to Appointment. Many years' Experience.
Address No. 6683, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

CONSTRUCTIVE DISTILLATION.

ADVERTISER is desirous of Representing go-ahead Firm in Vertical Retort Business. Thirty-five Years' Experience with Horizontal, Continuous, and Intermittent systems of Carbonization, with Considerable Experience in Conducting Comparative Tests and Records. South West, with West of England area preferred.
Address No. 6692, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

SCANDINAVIAN REPRESENTATIVE.

A GENTLEMAN (Age 40) in Denmark, who has been General Manager for Combined Gas, Water, and Electricity Works for Ten Years, with previous general knowledge and Practical Work in Denmark, and has Special Technical Knowledge required for the Sale of Fire-proof Material used in Retorts, and all Machinery required for Gas Making, Gauges, Pipes, Coal, &c., wishes to REPRESENT a British Firm in Scandinavia or Denmark only.
Address No. 6682, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

ADVERTISER desires to hear from a First-Class Firm who are desirous of Utilizing a Professional Man's Good SCANDINAVIAN CONNECTIONS for the Sale of all kinds of GAS and WATER FITTINGS and APPARATUS, and COAL.
Address, No. 6687, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

LONDON Agent having Offices in the City and Extensive Connection with Gas Companies and Principal Houses in the Lighting Trade, is prepared to represent Manufacturers for Home and Export on Commission Terms.
Address, No. 6688, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

APPOINTMENTS, &c., VACANT.

GREAT YARMOUTH GAS COMPANY.

ENGINEER AND GENERAL MANAGER.

THE Directors desire to Thank the Applicants for the above Position and to Inform them that the VACANCY HAS BEEN FILLED.

H. C. SALTER,
Secretary.

Great Yarmouth,
June 18, 1919.

ADVERTISEMENT No. 6666.

RETORT-HOUSE Foreman for a Gas- Works in the South of England.
This Position HAS NOW BEEN FILLED. Those who Applied for it are THANKED for their Applications.

LINCOLN CORPORATION.
(GAS DEPARTMENT.)

OUTDOOR Superintendent Wanted. Must be thoroughly Competent. Commencing Salary, £250.
State Age and Experience, and forward *copies* of references to W. H. MAINWARING, Gas Department, LINCOLN.

MALTON GAS COMPANY.

THE Directors invite Applications for the Post of ASSISTANT MANAGER and SECRETARY, who must have had Experience with Modern Carbonizing Methods, Carburetted Water-Gas Plant, Sulphate of Ammonia Plant, &c., and Possessing a Knowledge of Secretarial Duties. Gas Made, about 60 Millions per Annum.
Applications, stating Age, Experience, and Salary required (Testimonials will be asked for later), to be sent to

HUGH W. PEARSON,
Solicitor,
Malton, Yorks,
June 18, 1919. Chairman.

BOROUGH OF BATLEY.

THE Town Council of this Borough are prepared to receive Applications for the Appointment of GAS ENGINEER and MANAGER of their Gas-Works.
Applications, endorsed "Gas Engineer," stating Age and Salary required, with Particulars of Qualifications and Experience, and accompanied by *copies* of Recent Testimonials, to be Delivered at my Office not later than the 5th of July prox.

J. H. CRAIK,
Town Clerk.
Town Hall, Batley,
June 12, 1919.

WOMBWELL URBAN DISTRICT COUNCIL.

GAS AND WATER-WORKS ENGINEER AND MANAGER.

THE above Council invite Applications for the Appointment of ENGINEER and MANAGER of their Gas and Water Undertakings.
The Salary will be at the rate of £300 per Annum.
Forms of Application may be obtained from the undersigned, in which Candidates are required to furnish Particulars of their Age, Qualifications, and Experience, together with *copies* of Two recent Testimonials.
Applications, endorsed "Gas and Water Engineer," must reach me not later than the 2nd of July at Twelve o'clock noon.
Canvassing Members of the Council directly or indirectly will be deemed a Disqualification.

By order,
PERCY MILNES WALKER,
Clerk to the Council.
Town Hall, Wombwell,
June 19, 1919.

ASSISTANT Engineer and Manager Wanted for the Falkirk Corporation Gas Department.
Applications, giving full Particulars of Engineering and Technical Training, also Vertical Retort Experience (if any), Age, and Salary required, endorsed "Assistant Gas Engineer," to be addressed to the undersigned on or before Friday, July 4, 1919.

A. BALFOUR GRAY,
Town Clerk.
Burgh Building, Falkirk.

COUNTY BOROUGH OF WIGAN.

APPOINTMENT OF GAS-WORKS CHEMIST.

THE Wigan Corporation invite Applications for the Position of GAS-WORKS CHEMIST from persons who have had Experience in all Chemical subjects connected with a Gas-Works.
Salary £250, rising to £300 per Annum by two annual increments of £25, the first of such increments to commence at the end of the second year of service.
Applications, stating Age, Qualifications, and Experience, accompanied by *copies* of three recent Testimonials, to be sent to the undersigned not later than Monday, the 14th of July, 1919.

WILLIAM HENRY TYRER,
Town Clerk.
Town Clerk's Office,
Wigan,
June 17, 1919.

WANTED—Working Foreman for Gas-Works on East Coast—make upwards of 60,000,000 c.ft. per Annum. Must have a General Knowledge of the Routine of a Gas-Works and also Carbonizing Experience and Accustomed to Control Workmen.
Apply, stating Age, Experience, and Wages required, with One or Two recent Testimonials, to No. 6689, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED—Gas-Fitter and Meter INSPECTOR. Must be able to Fit-up all kinds of Apparatus in either Iron or Compo.
Applications, stating Age, Experience, and Wages, to The MANAGER, Gas-Works, KILDWICK, near Keighley.

PLANT, &c., FOR SALE & WANTED.

FOR SALE—"Reports of British Association of Gas Managers," 1870 to 1881; "Transactions" of Gas Institute, 1882 to 1889, and of the Incorporated Gas Institute, 1890 to 1902, also of the Institution of Gas Engineers, 1903 to 1918—being complete consecutively from 1870 to 1918; all the "Transactions" of the Incorporated Institution of Gas Engineers, 1891 to 1902, Vols. 1 to 12; Reports of District Gas Associations, 1888 to 1908 inclusive; and other Books useful to a student of Gas Engineering, and Gas Works Management. An opportunity seldom available for efficiency in the Profession.
Offers to No. 6691, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

GAS-ENGINE for Sale—Crossley Otto, Nominal H.P. 12; Maximum Indicated H.P., 33½. This Engine can be seen Running by Appointment. In Good Condition.
THOMAS S. NASH, Woolwich Saw Mills, 42, Union Street, WOOLWICH, S.E.

RE D. HULETT AND CO., LTD., 55 and 56, HIGH HOLBORN, W.C. 2.

To Gas and Water Companies, Gas Fitters, Electricians, Ironmongers, Brass Finishers, Illumination Contractors, Machinery Dealers, &c.

HENRY BUTCHER and CO. have received Instructions to SELL by AUCTION, on Wednesday, July 8, 1919, and Three following days, commencing each day at eleven o'clock a.m. precisely.
The whole of the Valuable and Extensive STOCK-IN-TRADE, PLANT, MACHINERY, FIXTURES, and FITTINGS of a Wholesale Gas Engineer, Electrician, and Plumbers' Merchant.
PLUMBING DEPARTMENT, comprising 20 Gross S.D. Stop, Bib, and Lavatory Cocks, 10 Gross Croydon Ball Valves, Bath Fittings, Cistern Fittings, Lead Pipe, Plumbers' and fine Solder.
GAS DEPARTMENT.—Several Hundred Gross Small Brass Gas-Fittings, comprising Main Cocks, Unions, Adapters, Burner Cocks, 1200 Gas Pendants, 2000 Gas Brackets, 200 Gross Blocks, 500 Gross Upright and Inverted Mantles, Magnesia Rods, Nozzles, Mica Chimneys, Consumers, Shades, Upright and Inverted Globes, Gas Boiling, Cooking, and Grilling Stoves, six dozen Hulett's Service Cleansers and Syphon Pumps, 500 Street Lamps in Tin and Copper Frames, Brackets, Cradles, Pillars, Columns, Swan Necks, Surgical, Medical, and Dental Lamps, Billiard Lights, Surprise Pendants, Hot Plates, Gas Fires, Wire Gas Guards, Metallic Tube, Pushons, Pipe Hooks, Compo. Pipe, Hollow Fuel.
TUBES AND FITTINGS.—5000 ft. Gas, Water, and Steam TUBES, Short Pieces, Bends, and Connectors, 50,000 Wrought and Malleable FITTINGS.
ILLUMINATION DEPARTMENT.—25,000 GAS and CANDLE BUCKET LAMPS, Crystal, Wrought-iron, Copper, Transparent Illumination Devices, 500 gross Lustre Studs, Drops, Dishes, and Arm Pans in clear and coloured glass.
ELECTRIC DEPARTMENT.—20 miles WIRES and CABLES, Pendants, Brackets, Lamp Holders, M.F. Lamps, Switches, Fuse Boxes, Ceiling Roses, Capping and Casing, Simplex Tubes and Fittings, Enamelled Shades, Leclanche Batteries, Silk Cord Flex, Flash Lamps, "Ever-ready" Batteries, Electric Bells.
GENERAL.—Ingot Tin, Brass-cased Tube, Brazed Brass Tube, 5 tons Bar Iron, Sheffield Files, Hacksaws and Frames, Stocks and Dies, Gas Tongs, Pliers, Copper Bits, Pipe Cutters, Tube Vices, Tinplates, Sheet Copper.
WORKSHOPS.—Double Forge (Alldays & Onions), 3 Anvils, 2 pairs Bellows, 2 Drilling Machines. 12 Brass Finishers' and other LATHES, 24 Vices, 4 Screwing Machines, No. 2 Sturtevant Blower, 5 H.P. Motor, 3 Polishing Heads, Shafting, Pulleys, Forge Tools, Stocks and Dies, 12 Ladders, 6 Trestles, Lacquering, Hot Plate, Dipping Tanks, 20 gallons Lacquers, Carboys, Spirits, a large quantity of loose Bench Tools.
COMPLETE TESTING SET FOR GAS-METERS.
FIXTURES AND FITTINGS.—Nests of Drawers, Counters, Shelving, Platform-weighing Machine, Wall and Counter Show Cases, Roll-top and other Desks, Chairs, Stools, Board-Room Furniture.
The whole of the Stock will be sold in large Trade Lots.
Goods on view Friday, Saturday, and Monday preceding and mornings of Sale.
Full Particulars and Catalogues from Messrs. FOSTER, SPICER, & FOSTER, Solicitors, 7, Queen Street Place, Cannon Street, E.C. 4; also of Messrs. HENRY BUTCHER & Co., Engineers' Valuers and Auctioneers, 63 and 64, CHANCERY LANE, London, W.C. 2.
NOTE.—On account of the large number of Lots, the Sale will commence on Tuesday, July 8, 1919, and continue for the Three following Days—Commencing at 11 o'clock each day precisely.

FOR Disposal.—
BOILER-TANK, sound, 6 ft. by 28 ft.
Ditto " 6 ft. by 20 ft.
Ditto " 4 ft. by 15 ft.
Open top, 20 by 14 by 8.
WANTED.—Small BENZOL PLANT.
Apply W. JOHNSON, JR., MEDWAY CHEMICAL WORKS, NEW HYTHE.

THE Richmond (Surrey) Gas Company have FOR SALE Two West's MANUAL CHARGING MACHINES, also Two DISCHARGING MACHINES. Suitable for small or medium-sized Gas-Works. In Excellent Condition.
For full Particulars, apply to E. GEORGE HUTCHINSON, Engineer and General Manager.

FOR SALE—Two 10-inch Two-Way PURIFIER VALVES and One 10-inch Four-Way PURIFIER VALVE.
Offers to the MANAGER, Gas-Works, UXBRIDGE.

FOR SALE—Two "National" 3-Ton STEAM LORRIES, Guaranteed in Good Running Order. Suitable for Gas-Works. £275 each.
Apply to GEO. MUNRO, LTD., 36-38, Long Acre, LONDON, W.C. 2. Telephone, 1482 Gerrard.

WANTED—A Second-Hand Station METER, in Good Condition, to Pass 40,000 to 50,000 c.ft. of Gas per Hour.
Address No. 6690, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

CONTRACTS OPEN.

CITY OF CARLISLE.

THE Gas Committee of the City of Carlisle are prepared to receive TENDERS for the COAL required at their Works during One Year, commencing July 1 next.
Tenders, endorsed "Coal," and addressed to the Chairman of the Gas Committee, to be Delivered not later than Wednesday next, the 25th inst., at the Gas-Works, Victoria Viaduct, Carlisle.
The lowest or any Tender not necessarily accepted.
Form of Tender and other Particulars may be obtained on Application to the undersigned.

J. E. BLUNDELL,
Engineer and Manager.
Gas-Works,
Carlisle,
June 17, 1919.

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CXLVI. No. 2928.] LONDON, JUNE 24, 1919. [71ST YEAR. PRICE 8d.

SOLVENE

The best naphthalene solvent on the market.

Works:
Birmingham
Glasgow
Leeds
Liverpool
Middlesbrough
Sunderland
Wakefield
Workington

Brotherton & Co. Ltd.
City Chambers,
Leeds.

Coal Tar Products:

Pitch.
Creosote.
Carbolic Oils and Acids.
Anthracene Oil.
Naphthalenes, &c.

Benzol Products:

Pure 90s and Standard Benzol.
Pure and Commercial Toluol.
Light and Heavy Solvents.
65% Crude Benzol.

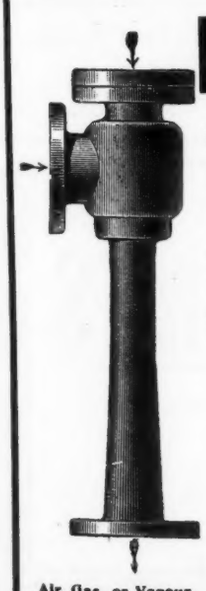
Motor Benzol

Sulphate of Ammonia

Muriate and Concentrated Ammonias

SIMON - CARVES, LTD.,
MANCHESTER.

'Phone— 8200 City (8 lines.)
Telegrams— "Simcar, Manchester."



Air, Gas, or Vapour Compressor or Ejector.

MELDRUM STEAM JET SPECIALITIES FOR GAS AND CHEMICAL WORKS.

COMPRESSORS, EJECTORS, EXHAUSTERS — for Air, Gas, Vapour, Fumes, &c.

ELEVATORS, AGITATORS, BOILING JETS — for Water, Acids, and all liquids.

FORCED DRAUGHT BLOWERS for all types of Furnaces.

RETORT SCURFERS, &c., &c.

MELDRUMS, LTD., TIMPERLEY, near MANCHESTER.

Agitate .

WROT. IRON AND STEEL TUBES, AND FITTINGS OF ALL KINDS.
BRASS AND GUNMETAL FITTINGS.
GAS LIGHT FITTINGS OF ALL STYLES AND DESIGN.

TRADE MARK.

JOHN RUSSELL & CO., LTD.

WORKS:
Alma Tube Works, WALSALL;
Belmont Brass Works, BIRMINGHAM.

WAREHOUSES:—LEEDS—15, Wellington Street.
BRISTOL—Colston Street. MANCHESTER—London Road.
LONDON—145, Queen Victoria Street, E.C.; 150, Charing Cross Road, W.C.;
58, Commercial Street, Spitalfields, E.; 43 & 45, Newington Butts, S.E.

THE BARROWFIELD IRON-WORKS, LTD.,

GAS ENGINEERS AND CONTRACTORS,

Telegrams: "GASOMETER GLASGOW."

GLASGOW.

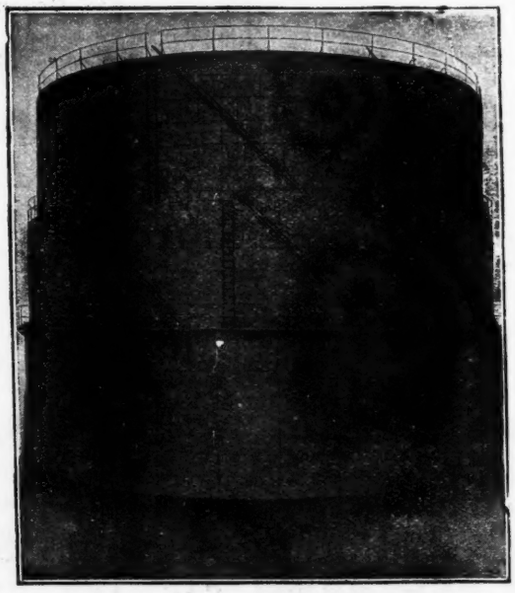
OIL PLANT AND CHEMICAL APPARATUS.

BRIDGES, GIRDERS, WHARVES, PIERS.

ROOFING OF EVERY STYLE.

PIPES, VALVES, AND CONNECTIONS.

London Office:
6, LITTLE BUSH LANE, CANNON STREET, E.C.



Spiral Guided and all other designs of Gasholders of any size supplied.

GAS APPARATUS OF EVERY DESCRIPTION.

RETORTS, CONDENSERS, SCRUBBERS, PURIFIERS.

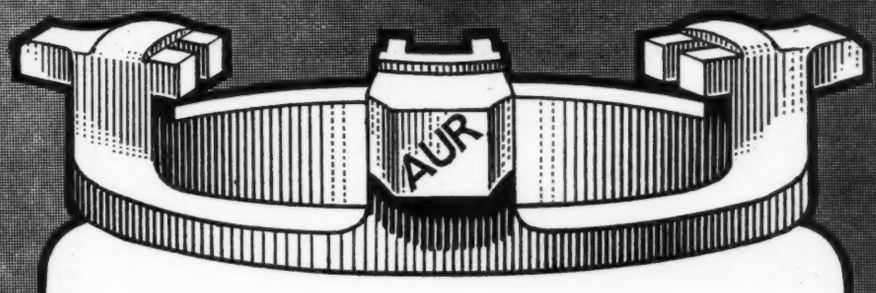
GASHOLDERS AND TANKS.

ENGINES, EXHAUSTERS, STEAM-BOILERS, AND FITTINGS.

HIGH PRESSURE GAS PLANTS

BOOSTING FANS, ROTARY & RECIPROCATING COMPRESSORS,
DISTRICT & SERVICE GOVERNORS.

GEO. WALLER & SON, LTD., Phœnix Iron-Works, STROUD, GLOS.



THE

WELSBACH

LIGHT CO., LTD.,

IS AN

ALL BRITISH COMPANY.

All Mantles British Made by British Labour.

THERE ARE NO BETTER MANTLES MADE.

Write for full Particulars and Samples.

THE WELSBACH LIGHT CO., LTD.,

WELSBACH HOUSE, KING'S CROSS, LONDON, W.C.1.

And at

BIRMINGHAM, BRISTOL, DUBLIN, HULL, LEEDS, MANCHESTER, and STOKE-ON-TRENT.

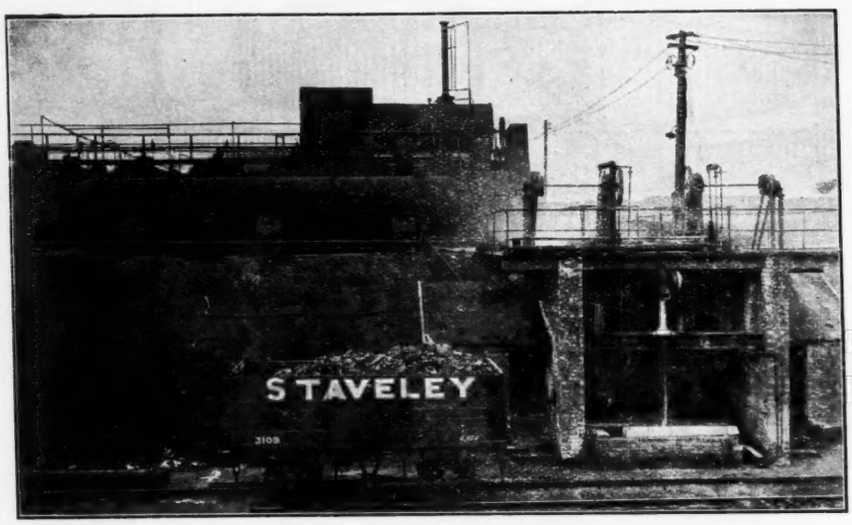
MANTLE FACTORY: WANDSWORTH, LONDON, S.W.18

The Welsbach Factory produces the largest number of Mantles of all Factories in the United Kingdom.

MOTOR BENZOL.

TO MANUFACTURERS.

In order to comply with present-day requirements, you will have to **desulphurize** your **Benzol.** Do this by the only commercially successful method on the market.



THE

"Staveley"

PROCESS.

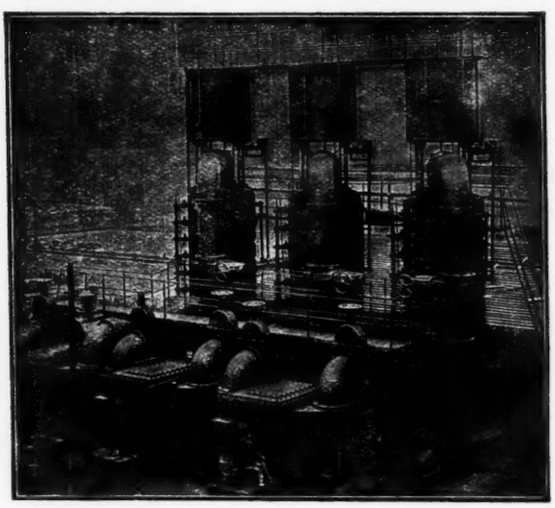
(B. PAT. No. 14152. 1915).

One Million Gallons of Benzol have been Desulphurized by this Process.

REMOVES THE SULPHUR WHICH IS UNTOUCHED by the ORDINARY WASHING WITH SULPHURIC ACID.

For further particulars, apply to—

THE STAVELEY COAL AND IRON CO., LTD., near **CHESTERFIELD.**



Patent "Standard" Centrifugal Washers

For Extraction of Ammonia, Toluol, Cyanide, Benzol, Naphthalene, &c., from Coal and Other Gases.

Patent "Standard" Centrifugal Washers (and "Standard" Tar Washers) at the Southall Station of the Brentford Gas Company.

Total Daily Capacity of machines ordered: **234,170,000** cubic feet.

KIRKHAM, HULETT, & CHANDLER, LTD

37-38, NORFOLK HOUSE, NORFOLK STREET, STRAND, W.C. 2.

Telegraphic Address—"WASHER, ESTRAND, LONDON." Telephone No. 1843 CITY.

Leakproof joints a certainty; even to Toluol tanks.

No matter what kind of joint you wish to make, you can be sure of it being leakproof if you use "Permac." This material is impervious to the action of gas, steam, water, toluol, benzole, and even fluorine gas, sulphuric acid, and caustics.

Permac *"In Powder Form."* JOINTING MATERIAL

is used by the largest Gas Companies and Chemical Manufacturers. Order a tin to-day. If your dealer cannot supply you from stock, apply to

THOMAS & BISHOP, Ltd.,

37, Tabernacle Street, LONDON, E.C. 2.

Glasgow: 95, Bath Street. Paris: 27, Rue Eugene-Varlin.

AND ALL GOOD DEALERS.

E.I.H.

ENTIRELY

BRITISH.

Gas Mantles of every description,
Upright and Inverted.

Curtiss & Harvey Ltd.
Cannon Street House, London, E.C.4.
The Largest Manufacturers of Gas Mantles in the British Empire.

GEORGE ORME & CO.

(Branch of Meters Ltd.),

Atlas Meter Works,

Telegraphic Address: "ORME, OLDHAM."
Telephone: No. 93 OLDHAM.

PARK STREET, **OLDHAM.**

"NEW CENTURY"

IMPROVED PATENT COIN

PREPAYMENT GAS-METERS

FITTED WITH DETACHABLE ATTACHMENTS.

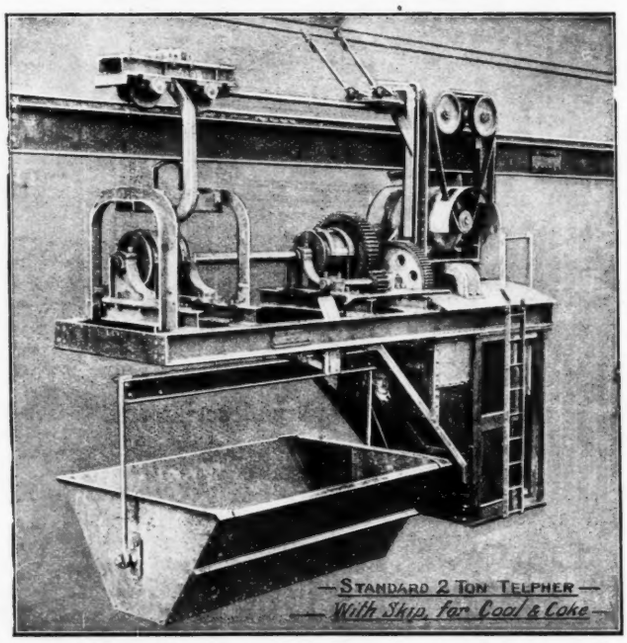
ARRANGED FOR 1d., 6d., 1s., OR ANY OTHER COIN DESIRED.

These Meters are giving Universal Satisfaction wherever adopted.

TELPHERS

Silent
Electrically Driven
Mono-Rail Telphers
for
Handling Coal, Hot or
Cold Coke Ashes,
etc.

Suitable for all kinds
of
Transport Service
work, by
Hook, Skip or Grab.



STANDARD 2 TON TELPHER
With Skip for Coal & Coke

Latest Improvements.

Simple to operate.

Powerful and perfectly balanced.

Sound mechanical construction, with freedom from breakdowns.

SOUTH WALES REPRESENTATIVES:
MESSRS. J. G. ELLIS & COY.,
WESTERN MAIL CHAMBERS,
CARDIFF.
TEL. NO. 2892 CARDIFF.

W. J. JENKINS & CO., LTD.
RETFORD. ENGINEERS NOTTS.

Telegrams:
"JENKINS,"
RETFORD.
Telephone 44 Retford.

The Stanton Ironworks Company, Limited,

NEAR NOTTINGHAM.

Cast Iron Pipes

"STANTON"

AND

"HOLWELL"

AND

JAMES OAKES & CO.

LONDON OFFICE:

MAXWELL HOUSE,
ARUNDEL STREET, W.C. 2.

Telephone: 6808 Central.
Telegrams: "Cobbles," Estrand, London.

MANCHESTER OFFICE:

GROSVENOR CHAMBERS,
DEANSGATE.

Telephone: 4945 City.
Telegrams: "Spigot," Manchester.

ESTABLISHED 1850.

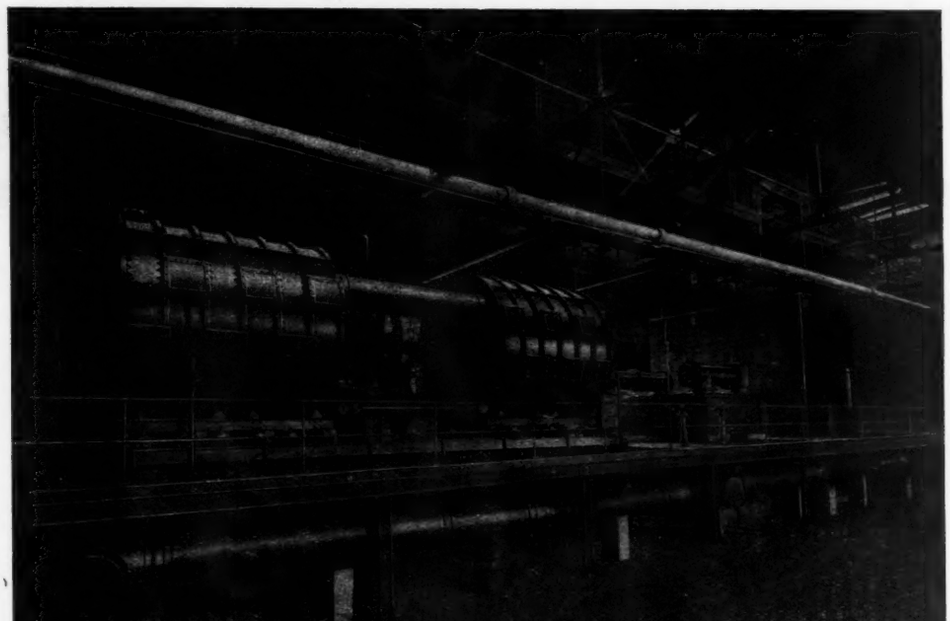
W. C. HOLMES & CO. LTD.

Whitestone Iron Works.

TELEGRAMS
"HOLMES, HUDDERSFIELD."
TELEPHONE
1575 PVTE. BRANCH EXCH.
CODES
A.B.C. (5TH EDITION
LIEBERS

HUDDERSFIELD.

CONDENSING AND WASHING PLANT.



PLANT ERECTED AT MONTREAL.

Capacity 5,000,000 Cubic Feet per Day.

WE SPECIALIZE IN

CONDENSERS, P. & A. TAR EXTRACTORS,
LIVESEY WASHERS, HOLMES' BRUSH WASHERS,
D. & L. CENTRIFUGAL WASHERS, PURIFIERS,
SULPHATE PLANTS, TAR DISTILLATION PLANTS,
HOLMES' DOUBLE FACED VALVES.

Browett-Lindley

Vertical GAS ENGINES

run steadily and continuously under all conditions of load. The skill and care devoted to their design and construction ensure uniformly satisfactory service, an exceptionally long and useful life and a minimum of expense for maintenance and repair

BROWETT, LINDLEY, & CO., LTD., Patricroft, Manchester.

London Office: Amberley House, Norfolk Street, Strand, W.C.
Glasgow Office: "Sandon," Westerton, N.B.

BETTER DRIVING POWER

The Anglo-American Oil Co. LTD.

beg to announce that their well-known brands of Motor Spirit are now obtainable—free of all restrictions.

PRATT'S AVIATION SPIRIT
PRATT'S PERFECTION SPIRIT
"TAXIBUS" for Commercial vehicles
"ANGLO'S" BENZOL

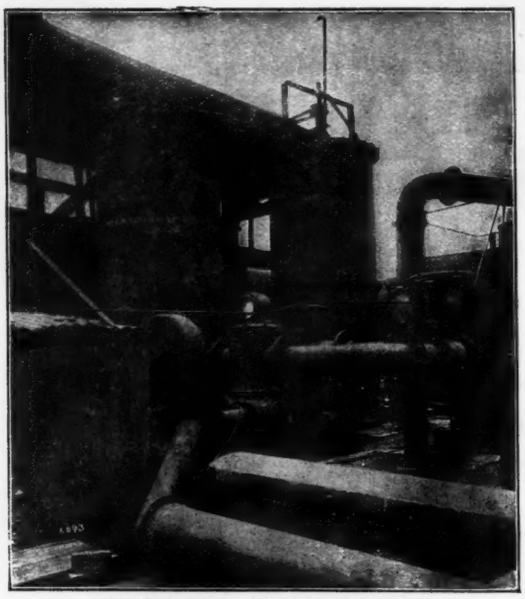
ENQUIRIES SOLICITED FOR

GAS OIL & FUEL OIL

HEAD OFFICE:—

36, QUEEN ANNE'S GATE, WESTMINSTER, S.W. 1

BRANCHES AND DEPOTS THROUGHOUT THE UNITED KINGDOM



WRITE FOR PARTICULARS.

BLAIR, CAMPBELL & McLEAN LTD.
GOVAN, GLASGOW.

Centrifugal Scrubbers

(McLAURIN PATENT).

Revolutionises existing methods of Benzol, Ammonia, and Cyanogen Recovery.

Actual photo. of Battery treating 90,000 c. ft. of Gas per hour, recovering all Ammonia and Oils from same with 95 per cent. Efficiency. Only 10 feet × 4 feet dia. for above duty, and costs about half compared with other types.

QUICK DELIVERY.

Orders on hand include Scrubbers for Benzol Recovery

Telegrams: "Blazon," Glasgow.

HARDMAN & HOLDEN, LTD. MANCHESTER.

Telegraphic Addresses:
"BENZOLE, MANCHESTER."
"BENZOLE, BLACKBURN."
"OXIDE, MANCHESTER."

Telephones
Manchester—Miles Platting and Clayton } City 8666 (3 lines).
Oxide, 2869 City Manchester, Blackburn, 6295 Blackburn.

All Bye-Products from the Distillation of Coal dealt with.

SPECIALITIES Carburetting Benzol, Benzol Absorbing Oil for Coke-Oven Plants, Toluol, Solvent, Heavy, and Burning Naphthas, Pyridine Bases, Carbolic Acid and Cresylic Acid, Soluble Disinfecting Fluid, Creosote, Fuel and Lucigen Oils, Black Varnish, Dipping Blacks, Prepared Tar for Asphalting, and for Road Treatment, Timber Creosoted for the Trade, &c. *See our Advertisement next week.*

THE "ALL BRITISH" LANTERN.

Windproof construction.

Porcelain reflector.

For inverted or upright burners.

Fitted with "London" Lamp Controller, to light and extinguish once or twice each night.

THE GAS METER COMPANY, LTD.

LONDON.
Head Office & Works:
238, KINGSLAND ROAD.
Telegrams... "Meterphone, London."
Telephone... Dalston 142.

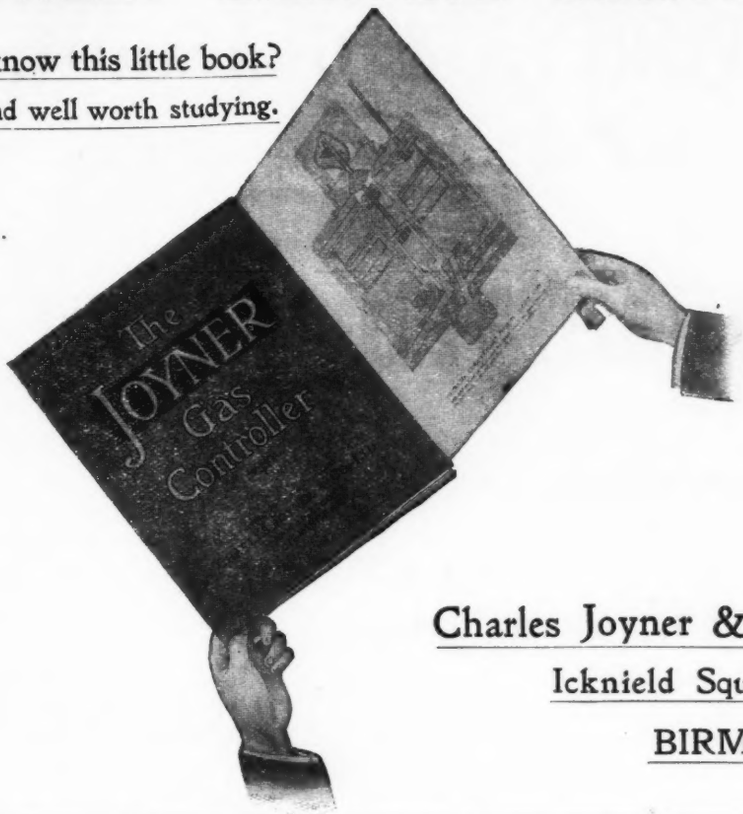
OLDHAM.
Works:
UNION STREET.
"Meter, Oldham"
Oldham 340.

DUBLIN.
Works:
HANOVER STREET.
"Meter, Dublin."
Dublin 1995.

MANCHESTER.
Works:
18, ATKINSON STREET.
"Meter, Manchester."
Central 2918.

STREET LIGHTING CONTROL.

Do you know this little book?
It's free, and well worth studying.



Charles Joyner & Co., Ltd.,
Icknield Square,
BIRMINGHAM.

VERITAS "INSULATED" BURNER

(BRITISH MADE).

A Burner of Artistic Design in which all the essentials of a high-class Burner are embodied.

DELIVERY FROM STOCK.

G. 73456.

PRICES ON APPLICATION.

Supplies are also available of "Inverted Bye-pass Taps." G. 7464a.

Please ask for particulars of our heavy quality. "Upright C Burner" (British made). with removable steatite head. G. 73544.

Falk, Stadelmann, & Co. LTD.
VERITAS LIGHT WORKS
LONDON GLASGOW MANCHESTER

HUMPHREYS & GLASGOW, LTD.

AND

The United Gas Improvement Co., U.S.A.

CARBURETTED WATER GAS

NINE REASONS:

1. **LOW CAPITAL COST,**
2. **Small Ground Space,**
3. **Control of Coke Market,**
4. **Independence of Coal and Labour,**
5. **Calorific and Illuminating Control,**
6. **Small Sulphur Content,**
7. **Freedom from Naphthalene,**
8. **Instant Production instead of Expensive Storage,**
9. **CHEAPER AND BETTER GAS.**

AND THE RESULT:

Humphreys & Glasgow, Ltd.	**368,400,000**	**Cubic Feet Daily.**
The U.G.I.Co., U.S.A.	**777,900,000**	**Cubic Feet Daily.**

OVER ONE THOUSAND MILLIONS CUBIC FT. DAILY.

BLUE WATER GAS

38, VICTORIA STREET, LONDON, S.W.

Bureau de Bruxelles: 82, Rue du Trone, Ixelles.

LEEK URBAN DISTRICT COUNCIL.

(LIGHTING COMMITTEE.)

THE Lighting Committee of the Leek Urban District Council invite TENDERS for the Supply of 4000 Tons of Washed GAS COAL NUTS, SINGLES, or SCREENED GAS COAL.

Tenders to be sent to the undersigned by June 27, 1919.

The Lighting Committee invite Tenders for the Purchase of the surplus TAR and AMMONIACAL LIQUOR made at the works from the 1st of July, 1919, to the 30th of June, 1920.

Approximate quantities are: Tar, 123,000 gallons; Ammoniacal Liquor, 810,000 gallons of 4° to 5° Twaddel strength.

Tenders to be sent to the undersigned by June 27, 1919.

RICHARD H. GINMAN,
Engineer and General Manager.

Gas-Works,
Leek, Staffs.

MANCHESTER CORPORATION.

(GAS-WORKS.)

TENDERS FOR COAL, NUTS, &c.

THE Gas Committee of the Corporation of Manchester are prepared to receive TENDERS for the Supply of their requirements of GAS COAL, NUTS, &c., at their Gaythorn, Rochdale Road, Bradford Road, and Droylsden Works, Delivery to be made over the Twelve Months ending June 30, 1920.

The Tender must state at what Colliery the Material offered is raised, and, in the case of Screened Materials, give the size of the Mesh of the Screen over which it is passed, with the angle of inclination of the Screen.

Printed Forms of Tender may be obtained on Application (in writing only) to Mr. Fredk. A. Price, Superintendent, Gas Department, Town Hall, Manchester, and Tenders, endorsed "Tender for Coal, Nuts, &c.," as the case may be, must be Delivered at the Gas Department, Town Hall, Manchester, before 10 o'clock on Monday morning, the 30th of June, 1919, addressed to the Chairman of the Gas Committee.

The Gas Committee do not bind themselves to accept any Tender, and reserve the right to divide any offer as they may deem advisable.

By order,
THOMAS HUDSON,
Town Clerk.

Town Hall, Manchester,
June 20, 1919.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

FRESH BOG ORE.

THE Commissioners are prepared to receive TENDERS for the Supply of about 1000 Tons of OXIDE OF IRON suitable for Gas Purification purposes, Delivered in Railway Wagons at Granton Gas-Works situated on the North British and Caledonian Railways.

Intending Contractors will be required to furnish the Engineer with the fullest Information as regards the material to be supplied (which shall contain not less than 60 p.ct of FeO, 3HO in the mass after Evaporation of the moisture at a temperature of 212° Fahr.). Further, the free moisture in the mass shall not exceed 50 p.ct. Preference will be given to a strongly fibrous material containing the above percentages of Peroxide of Iron.

Delivery will be required to be made before Sept. 15, 1919.

Tenders to be lodged by 10 a.m. on Saturday, the 5th of July, 1919. Sealed and Endorsed "Tender for Oxide of Iron," and addressed to the undersigned, from whom further Particulars may be obtained.

The Commissioners do not bind themselves to accept the lowest or any Offer.

JAMES M'G. JACK,
Clerk.

25, Waterloo Place,
Edinburgh.
June 21, 1919.

SPENBOROUGH URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TAR AND AMMONIACAL LIQUOR.

THE Council of the above District are prepared to receive TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR to be made at their Moorend Gas-Works during the Year ending June 30, 1920. The approximate quantities will be 850 and 1500 Tons respectively. Both Tar and Liquor will be sold on a Sliding Scale—Tar at a price per ton above the maximum price quoted weekly in the "GAS JOURNAL." Alternative Tenders are also invited for Tar on the Value of Products Basis. Liquor at a price per ton of 220 gallons of 10-oz. strength on the basis of the price of Sulphate at Hull as and when quoted weekly in the "GAS JOURNAL," or, failing such quotations, the price of 25 p.ct. Sulphate fixed from time to time by the Sulphate of Ammonia Association for home agricultural use.

The average strength of Liquor supplied by the Gas-Works is about 8-oz.

The Council can load into Buyers' Trucks on their Private Sidings (Lancashire and Yorkshire, Cleckheaton) if desired, or into Road Tanks.

Tenders, endorsed "Tender for Tar and Liquor," must reach me by Saturday, the 5th of July, 1919.

The Council do not bind themselves to accept the highest or any Tender.

JOHN H. LINFIELD,
Clerk to the Council.

Town Hall,
Cleckheaton,
June 19, 1919.

PENRITH URBAN DISTRICT COUNCIL.

TAR.

THE Gas Committee of the above Council are prepared to consider TENDERS for the Purchase of the Surplus TAR produced at their Works during the Year ending June 30, 1920.

Tenders, endorsed "Tender for Tar," must be Delivered to Mr. Geo. Wainwright, Clerk, Town Hall, Penrith, not later than noon on Saturday, July 5, 1919.

The Committee do not bind themselves to accept the highest or any Tender.

Further information may be obtained from
E. SHAUL,
Manager.

Gas-Works, Penrith,
June 19, 1919.

COMPANY NOTICES.

MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

TO THE SHAREHOLDERS.

NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at the Offices, 59 & 60, Gracechurch Street, London, E.C., on Tuesday, the 8th of July, 1919, at 11.30 a.m., for the purpose of receiving the Report of the Directors and the Accounts for the Year ended the 31st of March, 1919, and for the Transaction of the General Business of the Company.

One of the Directors, Mr. Strachan Child Clarke, retires from office, and offers himself for re-election.

The Auditors, Mr. Ernest Lionel Burton, F.S.A.A., and Mr. William Cash, F.C.A., retire, and offer themselves for re-election.

The TRANSFER BOOKS WILL BE CLOSED from the 25th day of June until the day of the Meeting, both days inclusive.

By order of the Board,
C. J. DAUN,
Secretary.

59 & 60, Gracechurch Street, E.C. 3,
June 17, 1919.

THE GAS LIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, SO FAR AS THEY RELATE TO CAPITAL STOCKS, WILL BE CLOSED at Four o'clock p.m. on Tuesday, the 1st day of July next, and will be RE-OPENED on the morning of Friday, the 1st day of August next.

By order,
WILLIAM LYLE GALBRAITH,
Secretary.

Chief Office: Horseferry Road,
Westminster, S.W. 1, June 17, 1919.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that they hold PERIODICAL SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 37, WALBROOK, E.C. 4.

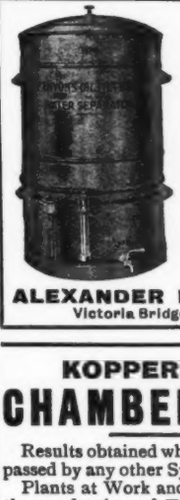
THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER,
Gas Engineers' Agents and Contractors for METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.
Inquiries Solicited.
Telegrams—"DARWINIAN, MANCHESTER."
Telephone—3268 & 3269 City (two lines).

"FIELD'S ANALYSIS"
1918.
Now Ready. *Price 30s.*
Orders to
EDEN FISHER & CO., Ld.,
6, 7, & 8, Clements Lane.
Lombard Street, E.C. 4.

R. LAIDLAW & SON LTD. (EDIN.)
GAS METER MAKERS.
ORDINARY & PREPAYMENT METERS
REPAIRS AND CONVERSION OF ORDINARY TO PREPAYMENT METERS RECEIVE PROMPT ATTENTION.
LONDON & EDINBURGH.

TROTTER, HAINES, & CORBETT, LIMITED.
BRETTEL'S ESTATE,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.
LONDON OFFICE: E. C. BROWN & Co., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
London Office:
NORFOLK HOUSE,
7, LAURENCE POUNTNEY HILL, E.C.4.


KENYON'S
PATENT
OIL FILTER
and
WATER
SEPARATOR
Over 900 ordered by H. M. Government.
ENGINEERS' STORES, TOOLS.
ALEXANDER KENYON & CO.,
Victoria Bridge, MANCHESTER.

KOPPERS' PATENT
CHAMBER OVENS.
Results obtained which have never been Surpassed by any other System of Carbonization.
Plants at Work and under Construction for the production of **70,000,000** cubic feet of Gas per Day.
See our large Advertisement appearing in alternate Issues of the "JOURNAL."
The KOPPERS'
COKE OVEN AND BYE-PRODUCT CO.,
301, Glossop Road, SHEFFIELD.

JOHN J.
GRIFFIN
& SONS, LTD.,
KEMBLE ST.,
KINGSWAY, LONDON, W.C.
MAKERS OF ALL THE
"BOYS" GAS CALORIMETERS
which have been in daily use in all the Official Testing Stations in London since the calorimetric test was introduced in 1906.
PYROMETERS
AND
THERMOMETERS
FOR
TECHNICAL & INDUSTRIAL PURPOSES.

Price 21s. net. Post free in the United Kingdom.

THE EIGHTH EDITION OF

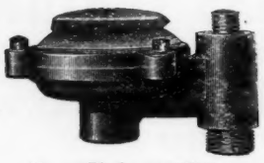
Newbigging's Handbook

FOR

Gas Engineers and Managers

(With PORTRAIT of WILLIAM MURDOCH as a Frontispiece.)

WALTER KING, "Gas Journal" Offices, 11, Bolt Court, Fleet St., London, E C.4.



No. 137 Diaphragm pattern.

:: Cheaper :: Street Lighting

It has been proved again and again that by fitting Peebles Lamp Governors to street lamps a *better* light is obtained and the hourly consumption is reduced materially. The saving varies according to locality and pressure, but is usually sufficient to pay for the cost of the Governors in a few weeks.

We will send a Peebles Lamp Governor on approval to any Gas Manager applying for same. State if this is required for upward or downward flow, capacity per hour, and average pressure.

PEEBLES & CO. LTD.
Jay Works
Bonnington,
EDINBURGH

E.J.H.

WATER SUPPLIES.

ARTESIAN BORED TUBE WELLS,

Norton's Patent "Abyssinian" Tube Wells.
Deep Well Pumps and Patent Air Lift Pumps.

LE GRAND & SUTCLIFF,

Artesian Well and Water-Works Engineers,

OFFICES: 133, BUNHILL ROW, LONDON, E.C.
MAGDALA WORKS, THE GREEN, SOUTHALL, G.W.R.

ROTARY METERS

are built in units or hourly capacities from

1000 cu. ft. to 1,000,000 cu. ft.

for COAL GAS, COKE OVEN GAS, AIR, &c.

ONE TENTH THE SPACE, ONE HALF THE COST OF "OLD STYLE" WET METER.

T. G. MARSH. **ROTARY METER CO. (1905) LTD.,** WHITEFIELD - - MANCHESTER.

THOMAS BUGDEN & Co.,

India-Rubber and Airproof Manufacturers and General Contractors.
LARGEST MANUFACTURERS OF GAS MAIN BAGS.
Telegrams—"AIRPROOF, ISLING, LONDON." Telephone—748 CITY.

Gas Bags for Repairing Mains.

PATENTEES OF THE **DENMAR BAG.**
Impervious to Main Liquor and Climatic Influences.

Drain Rods and Appliances.

Bellows and Inflators for Inflating Gas Bags.

Round or Cylinder Shape.

CONTRACTORS TO H.M. GOVERNMENT

Contractors' and Miners' Woollen Jackets, Trousers, Hats, &c.

Oilskin Clothing, Tarpaulins, &c., Tar Hose, Sewer Boots.

Hose, Tubing and Sheet of Every Description.

Wading and Well Dresses.

Stokers' Mitts and Gloves.

244, Coswell Road, LONDON, E.C.

GEORGE WILSON, COVENTRY.

Wet and Dry Gas Meter Manufacturer.

PREPAYMENT METERS for Pennies, Shillings, or any other Coin.

CAST-IRON PIPES FOR GAS, WATER, & STEAM,
also VALVES of all descriptions.

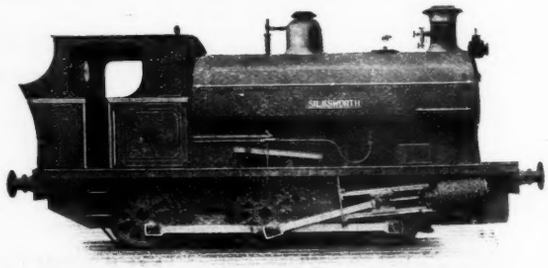
R. LAIDLAW & SON, LTD., ALLIANCE FOUNDRY, 147, MILTON STREET, GLASGOW.
OFFICE: 147, MILTON STREET, GLASGOW.

LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in progress for early delivery.

Photographs, Specifications, and Prices on Application.

PECKETT & SONS, Atlas Locomotive Works, LTD. BRISTOL.
Telegraphic Address: "PECKETT, BRISTOL."



In the quiet days of peace, and through the stour and stress of war, "ZEIMAR" gas mantles have held—and still hold—the unique position:

"ALWAYS ALL BRITISH."

THE RAMIE CO., LTD.,
Victoria Mills,
BREDBURY.

Scottish Depôt:
1, West Regent Street, GLASGOW.

THE
SHOOT-A-LITE GAS LIGHTER.
Instantaneous. Safe. Lasts a Lifetime.
Fifty times Cheaper than Matches: Twenty times Quicker.
ABSOLUTELY HARMLESS: ENTIRELY TRUSTWORTHY.

Cannot Scorch, Burn, Hurt.
Simply pull trigger until it snaps.
Lights all Kinds of Gas.
4/6 each .. 10,000 Lights.
Refills, 4d. each 10,000 more.

BUY A SHOOT-A-LITE AND SAVE MONEY, TROUBLE, DIRT, & FIRE DANGER. EVERY ONE GUARANTEED.
Indispensable in Home, Factory, Office.
Of all Ironmongers, Gas Companies, &c. Agents Wanted.
THE SHOOT-A-LITE SYNDICATE, LTD.
22, Ely Place, HOLBORN, E.C.1. DEPT. P.

COMPTOIR COMMERCIAL
de PRODUITS CHIMIQUES
97, Rue Saint-Lazare, PARIS IXe
Telegrams - - "Comchimic, Paris."
IMPORTERS OF
HEAVY TAR PRODUCTS
Correspondence solicited:

RETORT SETTINGS
WILSON'S (CONT-INT.) VERTICALS
HISLOP'S HORIZONTALS
RENEWALS & NEW BENCHES
GAS-WORKS ERECTED COMPLETE.
R. & G. HISLOP
Underwood House, **PAISLEY**

Victor Blagden & Co.
4, LLOYD'S AVENUE,
Buyers of all **LONDON, E.C. 3.**
TAR PRODUCTS

AMMONIA PRODUCTS		CYANOGEN PRODUCTS
SULPHATE	PITCH	PRUSSIATE POTASH
MURIATE	BENZOL	PRUSSIATE SODA
NITRATE	CREOSOTE	PRUSSIATE BALCIUM
CARBONATE	TOLUOLE	CYANIDE OF POTASSIUM
	CARBOLIC ACID	CYANIDE OF SODA
	SOLVENT NAPHTHA	
	PYRIDINE	
	NAPHTHALENES	
	CRESYLIC ACID	
	ETC.	

Telegraphic Address: "BLAGDENITE FEN, LONDON."

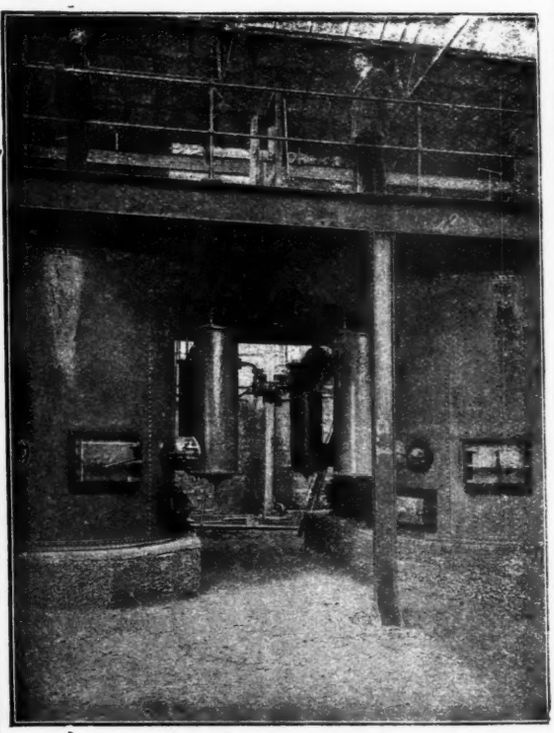
WATER-GAS PLANTS

BLUE OR CARBURETTED

(K. & A. and Smith's Patent.)

Features—

1. Simplicity of operation.
2. Convenience of working to meet sudden fluctuations of demand.
3. Low fuel consumption.
4. Minimum maintenance expense.
5. Efficient gas production of constant quality and low CO_2 content.



Designs, Estimates, and full Particulars on application.

PERRY & Co. (BOW), LTD.,
Engineers and Contractors,
56, Victoria Street, S.W.
Phone—2960 VICTORIA.
8382 "

NAPHTHALENE SOLVENT

"GAZINE"

(Registered in England and Abroad).

A radical Solvent and Preventative of Naphthalene deposits, and for the Automatic Cleaning of Mains and Services. It is used also for the enrichment of Gas.

Supplied only by

C. BOURNE,

WEST MOOR CHEMICAL WORKS, **KILLINGWORTH,**

Or *through his Agents,*

F. J. NICOL & Co., Pilgrim House, NEWCASTLE-ON-TYNE.

Telegrams: "DORIC, NEWCASTLE-ON-TYNE."
" "BOURNE, FOREST HALL."

National Telephone 2497.

Walter Waugh & Co.

4, LLOYDS AVENUE,
LONDON, E.C. 3.

Telegraphic Address:
"Swaltaugh, Fen., London."

Telephone:
6600 Avenue (3 lines).

TAR, AMMONIA, AND CYANOGEN PRODUCTS.

PITCH A SPECIALITY.

Special *Features*

— OF THE —

Guest-Gibbons STOKER

Heavy or Light Charges.

THE GUEST-GIBBONS SYSTEM OF CHARGING LOOSENS COAL IN RETORT AND ALLOWS FREE PASSAGE FOR GAS THROUGH CHARGE.

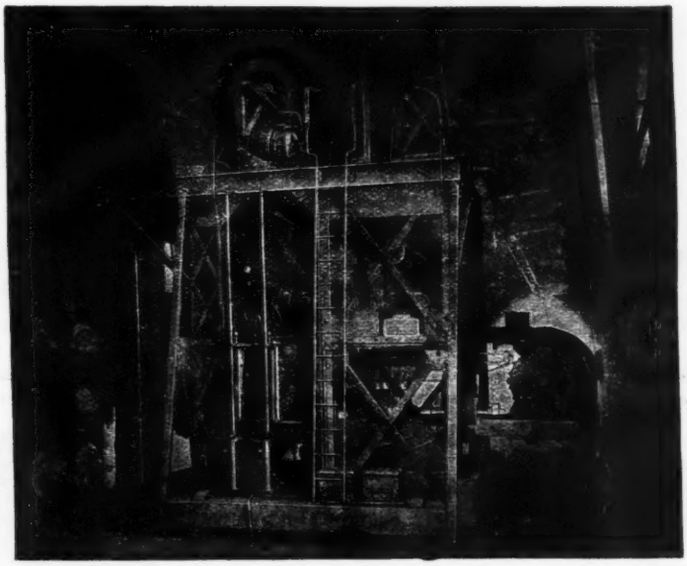
THE CHARGER-DISCHARGER HEAD BEING FLEXIBLE CANNOT DAMAGE RETORT.

CLEAN WORKING—NO DUST.

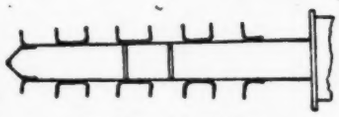
LOW UPKEEP COST.

IMPROVED QUALITY OF COKE.

ALL INTRICATE MECHANISM IS AVOIDED.



Drag-Bars carrying Coal.



Plan View of Drag-Bars.

Drag-Bars leaving Coal in Retort.

36 MACHINES at Work or on Order.

GIBBONS BROS., LTD., DUDLEY, WORCS.

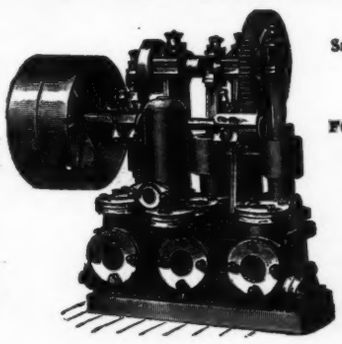
LONDON. MANCHESTER. CARDIFF. MELBOURNE.

JOSEPH EVANS & SONS, (WOLVERHAMPTON) LTD.

CULWELL WORKS, WOLVERHAMPTON.

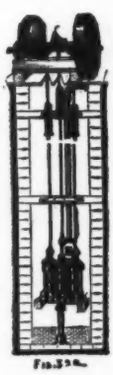
PUMPS

Telegrams:
"EVANS, WOLVERHAMPTON."
National Telephone No. 99.



London Address:
Salisbury House, London Wall, London, E.C.

PLEASE APPLY FOR CATALOGUE No. 8.



THE SOUTH METROPOLITAN GAS CO.

ARE OPEN TO PURCHASE

CRUDE NAPHTHAS AND LIGHT OILS

RESULTING FROM

DEHYDRATING

AND

OTHER TAR PLANTS

FROM PRODUCERS NOT HAVING FACILITIES FOR REFINING THESE PRODUCTS.

TAR PRODUCTS OFFICE,
709, OLD KENT ROAD, S.E. 15.

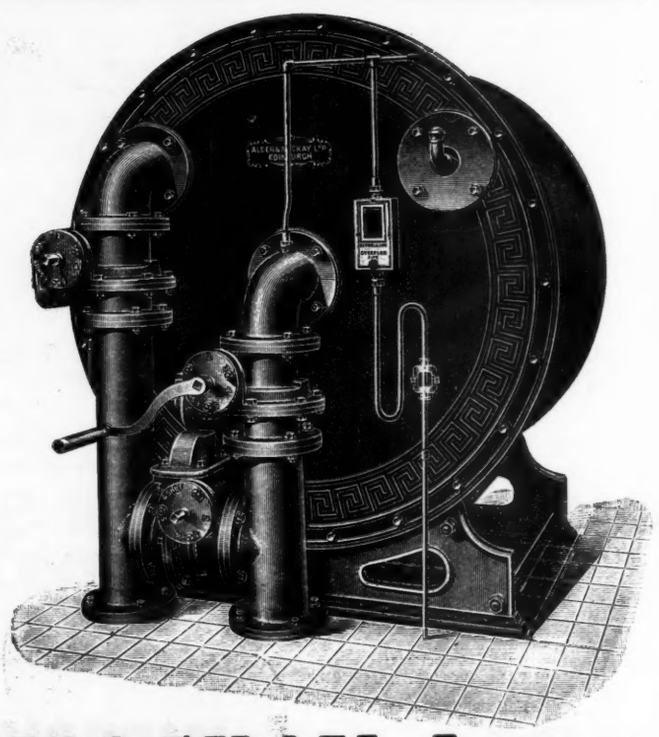
Cylindrical Station Meters

OF UNIFORM DESIGN.

ALL our round meters, from 2,500 cubic feet up to 30,000 cubic feet per hour, have this characteristic "Grecian key" pattern, cast in bas-relief upon both end plates.

The decoration of the meter can thereby be picked out with pleasing effect in different colours without employing skilled labour.

Our broad based cradles support the meter in a substantial manner. Nothing but "the best" about the whole outfit.



GUARANTEED.

ALDER & MACKAY, LTD.

Established 1850.

New Grange Works, EDINBURGH.
Telegrams: "ALDER EDINBURGH."
Telephone: 1481 CENTRAL.

BRADFORD.
BRANCH CLOSED DURING WARTIME.

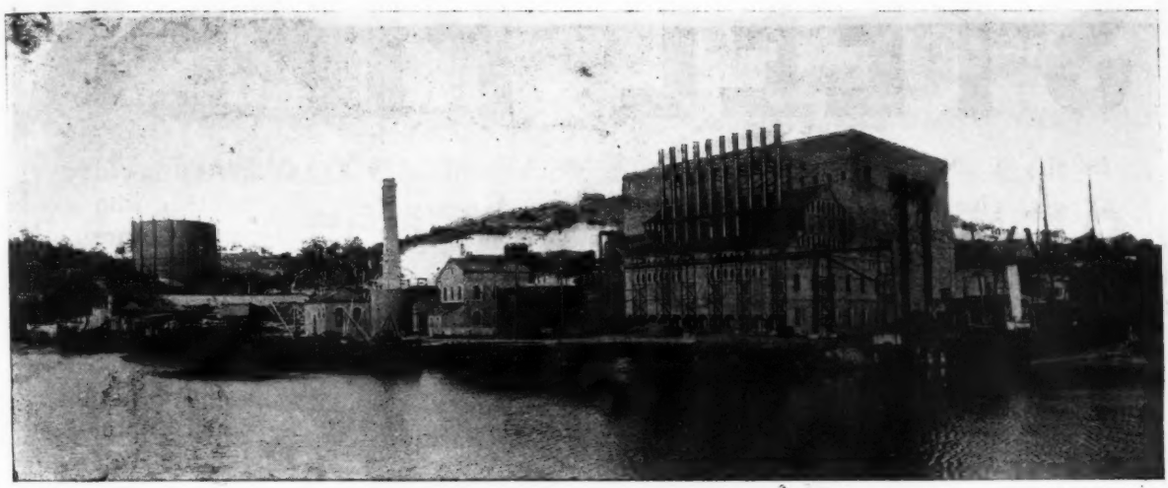
13, Victoria Street, Westminster, LONDON, S.W.
Telegrams: "ALDERUGI LONDON."
Telephone: 7643 VIC.

Central House, New Street, BIRMINGHAM.
Telegrams: "ALDERUGI BIRMINGHAM."

Bridge Street, SYDNEY, N.S.W.
Cable Address: "PLOVER SYDNEY."

Lower Taranaki Street, WELLINGTON, N.Z.
Cable Address: "BUTCHER WELLINGTON."

GLOVER-WEST VERTICAL RETORTS.



Installation at the North Sydney Gas-Works, New South Wales.

THE GLOVER-WEST SYSTEM OF HEATING THE RETORTS

PROVIDES FOR:

The continuous production of a percentage of water-gas by steaming the charge as it descends through the retort, resulting in

INCREASED OUTPUT FROM THE PLANT.

Increased volume of gas per ton.

Increased yield of heat units per ton.

Increased production of tar and ammoniacal liquor per ton of coal.

90 Glover-West plants of a daily capacity of **120 million c.ft.** are installed or in course of construction, in 15 Countries where 4 Works have 3 plants and 10 Works have 2 plants.

WEST'S GAS IMPROVEMENT CO., LTD.,

ENGINEERS,

Miles Platting, MANCHESTER.

Patent Inserted Joint
(Pat. No. 3189-11).

Steel Pipes with joints for lead and yarn are specially adapted for underground work. They are coated with Dr. Angus Smith's solution, and we recommend that in cases where excessive corrosion is likely to arise from acids in the soil they be wrapped in Hessian Cloth and recoated.

Longsleeve Patent Joint
(Pat. No. 3189-11).

STEEL PIPES

In the smaller sizes, these pipes can be bent on the ground to suit requirements. Larger sizes (up to 24 ins. diameter) are bent at the works to any curve required.

for Gas, Water, Air, Sewage, etc.

Long Sleeve Patent Welded Joint
(Patent No. 6173-12).

When welded together into a continuous main of any convenient length, say 500 ft., they may be rolled into place in the trench, sprung round curves, if necessary, and connected up without injuring the joints.

Light Lapwelded Steel Pipes

for Welding into Continuous Mains, in situ.

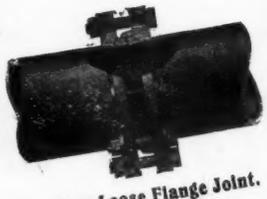
Catalogues sent on Application.

STEWARTS AND LLOYDS, LTD.,

41, Oswald Street, GLASGOW.
Broad Street Chambers, BIRMINGHAM.
Winchester House, Old Broad Street, LONDON.

No. 1. Loose Flange Joint.

Loose flanges are recommended for pipes which are laid above ground, or in shallow trenches; also for compressor air installations; while for mining work they are extensively adopted.



Albion Loose Flange Joint.

GEO. KENT LTD.

IRON AND BRASS FOUNDERS AND GENERAL ENGINEERS.

STATION AND DISTRICT

GAS METERS.

REGISTRATION BY DIAGRAM, SHOWING VARIATION IN CONSUMPTION.

REGISTRATION BY COUNTER, SHOWING TOTAL CONSUMPTION, OR COMBINED DIAGRAM AND COUNTER RECORDER.

COLD AND HOT WATER METERS, STEAM AND AIR METERS.

LEVEL RECORDERS OF EVERY DESCRIPTION.

HEAD OFFICES:- 199 HIGH HOLBORN, LONDON. *FOUNDRIES AND WORKS.* LONDON AND LUTON.

THE HORSELEY BRIDGE & ENGINEERING CO., LTD.

Works and Head Office: TIPTON, STAFFORDSHIRE.

London Office: 11, VICTORIA STREET, WESTMINSTER. Tel. Addresses: "HORSELEY, TIPTON," "GALILEO, LONDON."

MAKERS OF

GASHOLDERS & GAS PLANT.

PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES, PIPES, LAMP-PILLARS, RETORT-FITTINGS, CAST-IRON AND STEEL TANKS, PRESSED STEEL FLOORING, &c.

Also all kinds of STRUCTURAL IRON AND STEEL WORK, BRIDGES, ROOFS, PIERS, &c.

COAL TAR AND AMMONIA PRODUCTS.

Benzole, Toluole, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Dark Cresylic Acid, Granulated (Crude) and Sublimed Naphthalene, Anthracene, Refined Tar and Pitch. Sulphate of Ammonia containing a Guaranteed Minimum of 25 per cent. Ammonia. Beta Naphthol, Alpha Naphthylamine, Beta Naphthylamine.

For Prices apply to the SOUTH METROPOLITAN GAS COMPANY,

Telegraphic Address
Inland: "Metrogas, Peck. London."
Foreign: "Metrogas, London."

709, Old Kent Road, LONDON, S.E. 15.

THE

SAME PLANT

THAT MAKES

HOUSEHOLD AMMONIA

MAKES

YOUR

SULPHATE NEUTRAL.

WILTON'S PROCESS.

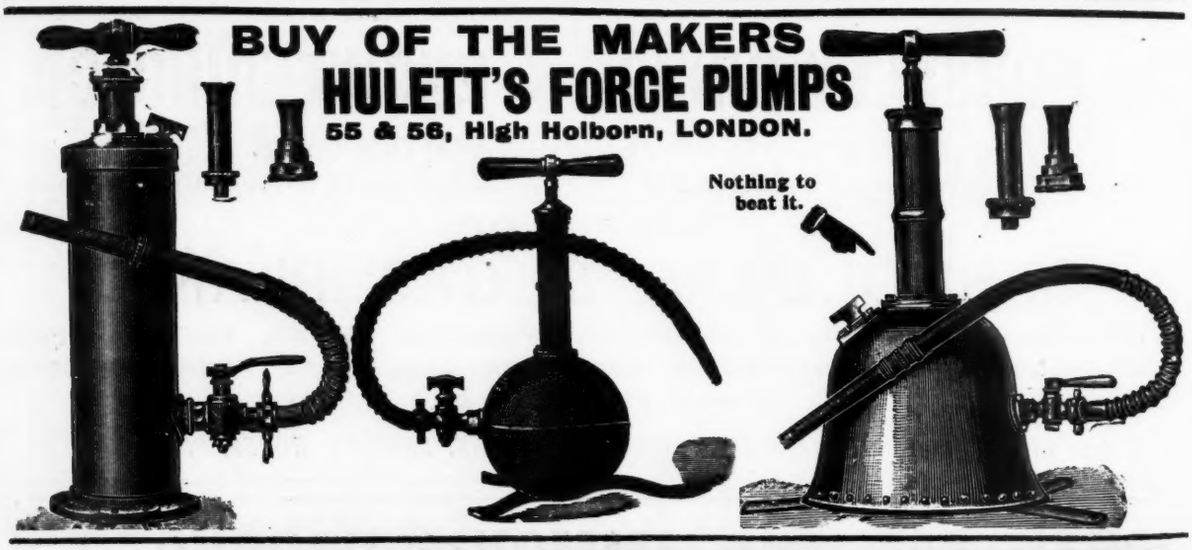
THE CHEMICAL ENGINEERING — and — WILTON'S PATENT FURNACE Co., Ld.

HENDON, LONDON, N.W. 4.

BUY OF THE MAKERS

HULETT'S FORCE PUMPS

55 & 56, High Holborn, LONDON.



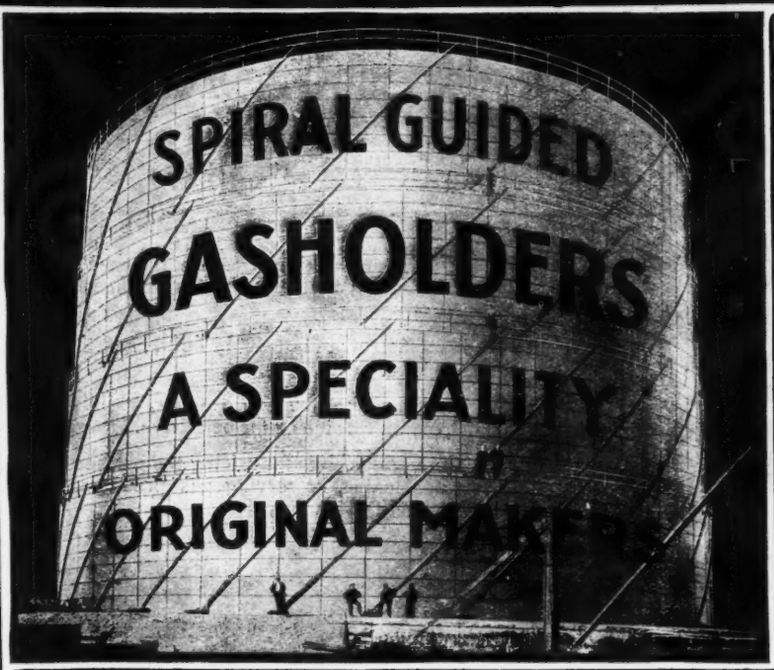
"B. B."

BEST BRITISH

GAS RETORTS AND FIRECLAY GOODS.

MOBBERLEY & PERRY LTD.,

STOURBRIDGE.



SPIRAL HOLDERS.

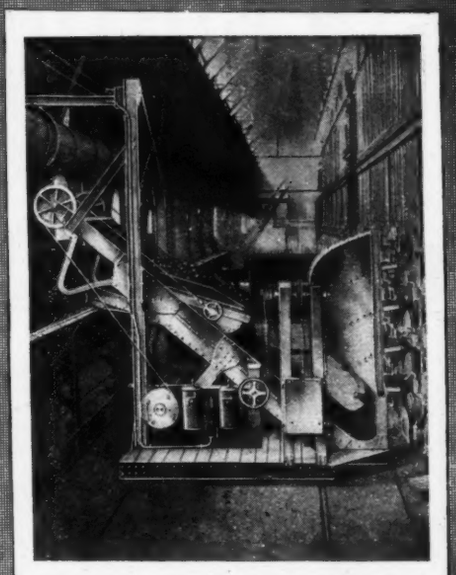
WHEN CONTEMPLATING EXTENSIONS PLEASE ALLOW US TO FURNISH PARTICULARS OF OUR SPECIALITIES

GASHOLDERS AND TANKS OF ANY SIZE AND DESIGN

CLAYTON, SON & Co., Ltd., MOOR END HUNSLET, LEEDS

LONDON OFFICE, 60 QUEEN VICTORIA ST., E.C.

DON'T CONVEY HOT COKE



"IDEAL" PATENT LIMITED Patent Hot Coke Transporter.

Comparative Maintenance:

HOT COKE TRANSPORTER LESS THAN 1/4d. PER TON.

HOT COKE CONVEYOR - 2d. TO 3d. PER TON.

DRAKES LIMITED, HALIFAX ENGLAND.

Pressure Raising FANS.

These Pressure Raisers maintain a steady pressure and give a through gas passage at all times.

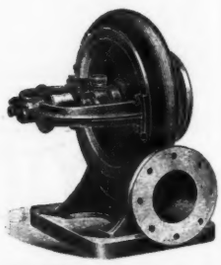
Highly efficient and strongly built, ensuring good service.

With direct coupled electric motor, as illustrated, steam turbine or for belt drive.

Made in various sizes for raising the pressure in service mains, or serving gas producers, furnaces, &c.

Write for catalogue.

We shall be pleased to advise on any question dealing with pressure raising.



JAMES KEITH & BLACKMAN CO., Ld.

27, Farringdon Avenue,
LONDON, E.C. 4.

CLAPHAM BROS. LTD. KEIGHLEY

TELEGRAMS CLAPHAM BROS. KEIGHLEY.
TELEPHONES 497 & 498 (2 LINES)

ECLIPSE SPECIALITIES

FOR MODERN PLANT

"Eclipse" Condenser, Capacity 4,000,000 c. ft. per diem. (Patent Reversible System.)

WATER TUBE CONDENSERS
LIVESEY WASHERS
P.&A.TAR EXTRACTORS
H.W. SPRAY WASHERS
PURIFIERS WITH ECLIPSE JOINT & TRIUMPH VALVES

Watch the Inset!!

Printed (at the Chancery Lane Printing Works, Ltd.), for WALTER KING, Publisher, No. 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.—Tuesday, June 24, 1919.

COWAN'S METERS.

A "KEW CERTIFICATE"

IS ONLY GIVEN WITH THE BEST QUALITY WATCH

BUT

A GAS METER INSPECTOR'S CERTIFICATE

is not a warranty of quality,
it simply signifies that the meter
registered correctly when tested.

CONTINUED ACCURACY

OF REGISTRATION IS DEPENDENT ON

QUALITY AND WORKMANSHIP

THEREFORE

BUY THE BEST.

W. & B. COWAN

INCORPORATED IN

Parkinson and W. & B. Cowan, Ltd.

FITZALAN STREET WORKS, KENNINGTON ROAD, LONDON, S.E. 11.

Dalton Street Works, Newtown, **MANCHESTER**; Buccleuch Street Works, **EDINBURGH**; The Glasgow Meter Works, 57, John Street, Bridgeton, **GLASGOW**; Hill Street Works, **BELFAST**; Commonwealth Meter Works, Bulletin Place (off Macquarie Place), **SYDNEY, N.S.W.**; 56, a'Beckett Street, **MELBOURNE**; Duncan Street, Fortitude Valley, **BRISBANE**; Ballance Street Works, **WELLINGTON, N. Z.**

THE GAS METER COMPANY, Ltd.,

Manufacturers of

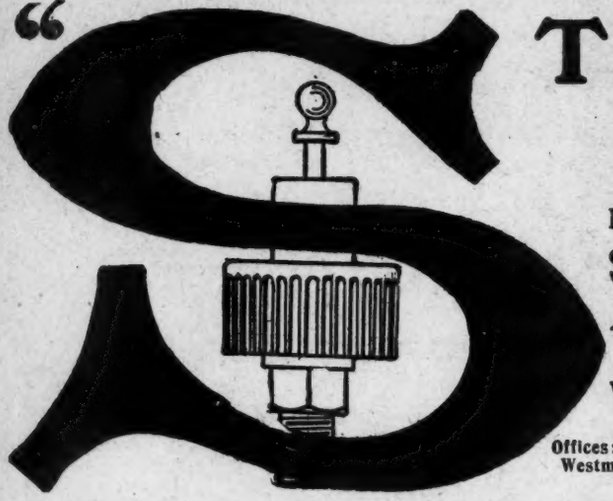
GAS METERS OF ALL KINDS.

Consumers' Wet, Dry, Ordinary or Prepayment Meters, Station Meters, Governors, Gauges, Testing Apparatus.

SIXTY Years' reputation for quality of materials and workmanship still maintained.

LONDON.	OLDHAM.	DUBLIN.	MANCHESTER.
HEAD OFFICE & WORKS.	WORKS.	WORKS.	WORKS.
Letters: 238, Kingsland Road.	Union Street.	Hanover Street.	18, Atkinson Street.
Telegrams: "Meterphone, London."	"Meter, Oldham."	"Meter, Dublin."	"Meter, Manchester."
Telephone: Dalston 142.	Oldham 340.	Dublin 1995.	Central 2918.

GAS RETORTS
HARRIS & PEARSON
STOURBRIDGE ENGLAND.
GLAZED BRICKS, WHITE & IN COLOURS, PORCELAIN BATHS, FIRE-CLAY GOODS OF ALL KINDS, HARD BLUE PAVING BRICKS FOR RETORT-HOUSES, BEST RETORT BOLTS, CAST-IRON RETORT MOUTHPIECES, FITTINGS, & LIDS, CAST-IRON GAS & WATER PIPES & CONNECTIONS OF ALL SHAPES AND SIZES.
Manufacturers of
Fire Bricks, Lumps & Tiles
OF EVERY DESCRIPTION.



"TAUFFER'S LUBRICANT"

REG. TRADE MARK.

FOR 30 YEARS AND STILL THE STANDARD MACHINE GREASE.

A BRITISH PRODUCT

Made Only at their

WORKS in SOUTH LONDON, by

Offices: 36, Victoria St., Westminster, S.W. 1. **TRIER BROS., Ltd.**

WELSBACH MANTLES

Are British Made by British Labour.

THE ORIGINAL

and

STILL THE BEST

See Advertisement on Page 785 of this Issue

Printed (at the Chancery Lane Printing Works, Ltd.), for Walter Ewe, Publisher, No. 11, Bolt Court, Fleet Street, London, E.C. 4.—Tuesday, June 24, 1919.